1908.

Philip Smith.

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THE

YOUNG PAINTER's

MAULSTICK;

BEING

A PRACTICAL TREATISE ON

PERSPECTIVE;

CONTAINING

RULES AND PRINCIPLES

FOR

DELINEATION ON PLANES,

Treated ſo as to render the Art of Drawing correctly, eaſy of Attainment even to common Capacities; and entertaining at the ſame Time, from its Truth and Facility. Founded on the clear mechanical Proceſs of

VIGNOLA AND SIRIGATTI;

UNITED WITH THE THEORETIC PRINCIPLES OF THE CELEBRATED

DR. BROOK TAYLOR.

ADDRESSED

TO STUDENTS IN DRAWING.

BY JAMES MALTON,

ARCHITECT AND DRAFTSMAN.

That not in fancy's maize he wander'd long,
But ſtoop'd to truth and moraliz'd his ſong. POPE.

London:

PRINTED BY V. GRIFFITHS, NO. 1, PATERNOSTER ROW; AND PUBLISHED FOR THE AUTHOR, BY CARPENTER AND CO. OLD BOND STREET.

1800.

TO

BENJAMIN WEST, ESQ;

President

OF THE

ROYAL BRITISH ACADEMY FOR PAINTING,

AND TO THE

ACADEMICIANS and ASSOCIATES

OF THAT

INSTITUTION,

This Work

IS RESPECTFULLY DEDICATED,

With hope that it may be approved by them and efteemed deferving of being recommended to the Attention of the Students under their Care;

BY THEIR HUMBLE SERVANT,

JAMES MALTON.

A P O L O G Y.

DESIROUS to avoid every charge of presumption, for presenting a work on Perspective to the public, while so many are extant, and during the lifetime of my father Mr. Thomas Malton, sen. who has himself sent into the world so extensive and so excellent a treatise on the same subject; I deem it but proper to urge a few reasons which actuated me to add another to the number, in vindication of myself, should any be inclined to censure me for having so done.

I had long heard it advanced, and by persons possessing the works of the best informed writers on this head, not excepting even that by my father, that there yet was wanting a practical treatise, which would exemplify the doctrine of delineation, in an easy, familiar, and engaging manner; and wherein its rules might be applied to pleasing and painter-like subjects. I could not but admit the justness of such remarks, nor deny that I had observed the same, and had very early in life felt a strong inclination to be myself the person who should supply that desideratum.

My acquaintance with the subject, according to the elegant principles of Brook Taylor, and my having made frequent, but ineffectual, endeavours to teach it on those principles, and make it engaging at the same time, reduced me to the necessity of adopting the method of practice that is followed throughout this work, which is a mixture of the scientific principles of Brook Taylor, with the clear mechanical mode of Vignola and Sirigatti; making a most pleasing, facile, and entertaining, union; the correctness and dispatch of which manner of delineation is admitted by my father, and slightly treated on by him in the appendix to his valuable work.

Independent of the want of an agreeable method of procedure, the figures whereon the generality of authors on Perspective have employed their rules, have, very feebly, conveyed positive information, being, by much the greater part, ill conceived, and rather disgusting, in lieu of being inviting. The voluminous prolixity of some, obscure brevity of others, trifling littleness of many, and partial application of most of them, have neither rendered the subject interesting, nor given general information. Some have been purely mathematical, others wholly mechanical, and few, or none, seem to have made due reference to the painter. I hope that I shall be found to have proceeded otherwise. By nature I was better gifted with the talent requisite for a painter, than for a mathematician; yet I delighted in the pursuits of both, and was capable at the age of fourteen, to demonstrate any problem in the twelfth book of Euclid, of delineating any regular piece of architecture in perspective, of taking a correct draft from a plaster cast of the human figure, of drawing any of the five orders of architecture, or of copying a landscape of Barratt, or of Gainsborough. This, it will be observed, I advance not with a view of boasting of what I was, or am, capable of performing, but to instance the likelihood there is, that this work will be found less tediously dry, than those of my predecessors on the same subject.

The inclination I entertained, I was earnestly encouraged to the performance of, by persons who judged me competent to the task, some of whom I had the honor to instruct in the art. For ten years past I have been occasionally engaged preparing the subject matter, from my own knowledge of the art, observations from great practice, and remarks from the observations of others, (arising from imperfect knowledge, or erroneous conceptions concerning it,) and arranging and digesting the whole that it might, as much as I could make it, be worthy to meet the master painter's eye, and engage the serious attention of the student.

It is not my intention to attempt to prove that the principles of procedure of this work, are the best that could be given; there being several ways to effect the same end, each may, probably with good reason, have its distinct admirers. It will be sufficient for me to assure my readers that, from knowledge of these various ways, great practice, and experience in teach-

ing, I have ever found mine moſt expeditious, certain, and eaſy of attainment. Should any be deſirous to fathom the ſubject to its depth, to gratify a laudable curioſity, they may obtain that ſatisfaction, by looking into more elaborate works; as my Father's, Highmore's, or Hamilton's, or Brook Taylor's itſelf; but which labour it was my intention, by this work, to ſave thoſe whoſe deſire it is to obtain knowledge of the art on juſt principles, with as little trouble as poſſible; and with a view to acquire only that ſufficiency of it, as to enable them to project ordinary objects with truth and facility.

Throughout this work, I lay claim to as little favour as the gentle critic may be diſpoſed to allow me; I look upon myſelf as competent to the taſk I have undertaken, and am not above telling my readers, it has been a matter of twelve years leiſure conſideration; I hope for that indulgence only, which humanity ſhould ever allow to human frailties. I undertook it with the flattering hope of pleaſing all, but now publiſh it with great fear of not thoroughly ſatisfying any. Knowledge of perſpective has been ſubject of great delight to me, and cannot but be a pleaſure and advantage to every artiſt. A grateful deſire to communicate that advantage to others has been throughout, a conſiderable motive to my executing this work; other reaſons will no doubt be laid to my account, and which I am by no means inclined to diſallow; but intereſt, I can ſafely aſſert in this caſe, yields place to more liberal motives.

Exclamation is but too ready to be made at the great bulk of works on perſpective, as alſo at their expence. It would be adviſeable for ſuch perſons to reſort to Brook Taylor, where they will have no reaſon to object to either of thoſe conſiderations. But fully to elucidate and exemplify that author's work, ſo as to render it clear to common capacities, would extend to a large folio volume or two, with numerous plates. That works on perſpective are bulky, ariſes from the earneſt deſire their authors have had thoroughly to inveſtigate the ſubject, that it might be fully underſtood by thoſe for whoſe advantage it was deſigned; bulk therefore ſhould not be cauſe of objection, what is ſuperfluous, to the diſcerning, may be paſſed over. Their expence is certainly ſtill leſs a matter of complaint, the moſt voluminous and expenſive of them, has ſeldom I believe, exceeded the ſum of three pounds. What would three pounds be towards purchaſing any good picture by a great maſter? which is often done by artiſts to examine minutely into their principles of colouring, compoſition, and the like. And is a knowledge of perſpective of leſs conſequence? A very ſenſible writer [a] obſerves, "Whatever ſome people may think, "a picture deſigned according to the rules of perſpective, and the principles of anatomy, will "ever be held in higher eſteem by good judges, than a picture ill drawn, let it be ever ſo "well coloured. For nature, though ſhe forms men of various colours and complexions, never "operates in their motions contrary to the mechanical principles of anatomy, nor, in exhibiting "theſe motions to the eye, againſt the geometrical laws of perſpective." An artiſt, ſenſible of any want of knowledge of perſpective ſhould purchaſe and carefully examine every work on the ſubject that is publiſhed, until, from ſome one, or all, he gleaned every information requiſite.

Almoſt every late author on this ſubject has taken occaſion to obſerve, that there have been many treatiſes written on it, probably preſuming his would preclude the neceſſity of any other; but ſo far am I from intimating or imagining the ſame of mine, that I hope to ſee many ſucceed it, and ſhall eſteem myſelf happy in forming one ſtep to a ladder by means of which, ſome one, fortunately favoured, ſhall happily reach perfection, and compoſe a work moſt engaging to where it is moſt applicable, and that PAINTERS, not MATHEMATICIANS, ſhall evince to the world moſt acquaintance with perſpective.

[a] Count Algarotti, F. R. S. F. S. A.

PREFACE.

AT the present æra to enter on any eulogium on painting, or to endeavour to point out its advantages, either to a learned or commercial ſociety, would be, if not impertinent, at leaſt ſuperfluous. Facts that are perfectly eſtabliſhed, and which are of themſelves indiſputable, require not proof. To further the perfection of the art is all that is now required of its advocates: inſtances of its value, and of the great eſtimation which it has ever obtained in all poliſhed nations, from thoſe moſt able to appreciate its worth, are to be found innumerable. No one can reflect on its aid and influence in the fields of ſcience, or conſider how it enlarges the channels of manufacture and commerce, without being perfectly ſenſible of its importance: in an inſtant does it impart value to worthleſs materials, and, it may be ſaid, with god-like power, give to ſhapeleſs matter, form, life, and beauty! But the Arts themſelves, though the great ſource of wealth to manufactures, diſdain to be reduced to their level; they may exalt the humble trades of neceſſity, but will not float in the ſame ſtream; vain, very vain, muſt every attempt be to *manufacture* Pictures! Even the hand that executed the firſt production cannot produce an equal copy; the fire, the ſpirit, the energy, is gone. Painting is the ſource of the eye's delight, an elegant refiner of life; and inaſmuch as it is brought to perfection, is a nation refined, and does ſentiment and every virtuous feeling engender that enlarges the mind and expands the human heart.

More than any other art or ſcience, painting labours under diſadvantages, as to a certain road to acquirement. The advances of prior exploriſts avail but little the emulous enterprizing ſtudent, like a veſſel that proudly traverſes the ocean, the pride of art, and admiration of beholders, painting ſteers her ſtately courſe; the artiſt, who moſt excels, conducts the helm, but leaves ſmall traces behind to mark her way, or guide her anxious votary's purſuit.

The ſcience of optics, only, lends a conſiderable portion of certain advantage to painting, in that branch of it which relates to direct viſion.. This aſſiſtance has not been overlooked, but much conſidered, and copiouſly treated on by numerous writers, under the head PERSPECTIVE. Perſpective gives infallible

rules for delineation; it is the art of depicting objects on planes, fo as truly to reprefent them as they appear. The very definition anticipates all that can be faid in its recommendation. Linear perfpective, as far as its effect extends, furnifhes a fure and folid foundation to the art of delineation; but unfortunately, its utility has been infufficiently regarded, and lefs efteemed by thofe to whom its information was of the utmoft value; while its merits have been minutely inquired into, and its worth fully eftablifhed by others, to whom it could impart no practical advantage whatever. By the mathematicians it has long been engroffed, they have induftrioufly afcertained the infallibility and extent of its powers, and from time to time have offered the matured child to its original parents, but indeed fo obfcured by mathematical fymbols, with *thefis, hypothefis,* and *demonftration,* as fcarcely to be recognizable by them, and the painter-ftudent is literally loft "in the intricate mazes of the *liney* labyrinth." Artifts however, fenfible of their right and its advantages, fhould again refume it, diveft it of its obfcurities, develop its beauties, and adapt it to their particular refearches.

A genius for painting or for poetry, feems almoft incompatible with profound fkill in mathematical fciences. There are, to be fure, few general rules without exceptions; not that I know any in the prefent inftance, but there may be both painters and poets deeply converfant with, and who delight in the mathematics; but this I am inclined to imagine, is by no means common. Reafons for this difunion of purfuits, and where one has fome dependance on the other, are not however difficult to be affigned; the exercife of either of the two former fafcinating arts, being produced chiefly by a warm luxuriant imagination, is indignant of reftraint; the fancy, prompt and eager to exprefs its impulfes, fpurns thofe trammels that would curb its impetuofity, or retard its endeavours, rejecting the flow, but fure advances of art.

The fhorteft, and only fecure road to knowledge, leads through theory to practice; a neglect of which procedure, with regard to painting, is the caufe of the many erroneous productions which with concern we too frequently witnefs: nor are fuch errors leffened when endeavoured to be palliated by the fometimes admiffible, but abufed, term of licenfes. No one can properly be faid to have taken a licenfe but he who knows the boundaries of rule. Poets and Painters have their peculiar liberties moft liberally granted them, and, ufed with difcretion and judgment, they are ever admitted. He who proceeds licentioufly, without inquiry, or guide, muft not be furprifed to meet the fate of Phæton. It may be faid I regard not the rigid

trammels of prefcription ; rule fhall not confine me ; my *genius* or my *will*, fhall have its fway ; *laws* fhall not conftrain me : Then tell the rules tranfgreffed ? Make known the boundaries broken through ? Affign reafons for fo doing ? Unlefs that can be done, and juft motives be advanced in extenuation, all is anarchy, licentioufnefs, and breach of order. Active genius may not want the fpur, but frequently ftands in need of the curb.

Sir Jofhua Reynolds, in his firft difcourfe delivered to the Royal Academy, fpeaking of the ftudy and practice of painting in general, fays, "Every oppor-"tunity fhould be taken to difcountenance that falfe and vulgar opinion, that rules "are the fetters of genius ; they are fetters only to men of no genius; as that ar-"mour, which upon the ftrong is an ornament and a defence, upon the weak "becomes a load, and cripples the body which it was made to protect. How "much liberty may be taken to break through thofe rules, and, as the Poet ex-"preffes it, *To fnatch a grace beyond the reach of art*, may be a fubfequent confide-"ration, when the pupils become mafters themfelves. It is then, when their "genius has received its utmoft improvement, that rules may poffibly be difpenfed "with. But let us not deftroy the fcaffold, until we have raifed the building."

The modern Painters are lefs regardful of a knowledge of perfpective than were the ancients. By the ancients it was known and cultivated, and their difcoveries and opinions of its confequence in painting have been repeatedly handed down to us. By the moderns it is neglected and almoft loft ; by many, more than neglected, more than loft, ridiculed, and difingenuoufly reprefented. 'Tis true there are fome painters ingenious in perfpective, and who do earneftly recommend the ftudy of it ; fome in my knowledge and whom I could here mention, but for obvious reafons : the fame motives however do not withhold me refpecting the late Sir Jofhua Reynolds, whofe incomparable difcourfes on painting in general are given complete, to an indebted world, by his friend Edward Malone, Efq. and prove that Sir Jofhua's knowledge of perfpective as well as of painting was confummate.

Rules and precepts have often been drawn up as guides to the young ftudent in the art of painting. Few have been more confidered, and in many refpects moft juftly, than thofe written in Latin verfe by Du Frefnoy[a]. They compofe a work of much labour and learning, and of which there are feveral tranflations into Englifh ; one by the celebrated Dryden, in profe, but in a manner not much to his credit, the fubject being, apparently, not well underftood by him. A poetical

[a] A diftinguifhed French Artift, who died in 1665.

tranflation by Mr. Mafon,[a] is a mafterly performance, and what renders this production ftill more valuable and complete, is its being accompanied with elucidatory notes by his friend Sir Jofhua Reynolds; in the courfe of which the fubftance of much important matter is unfolded with additional information.

Among the many pertinent obfervations in this excellent Poem is one very exceptionable paffage on perfpective; in which, the Author miftaken himfelf, or probably not knowing, or not liking the fubject, has moft unjuftly, and incorrectly remarked concerning that only *certain* aid to painting. As this Poem is defervedly much read and in the hands of almoft every ftudent, it is but proper that fuch unfound doctrine fhould be expofed. In Englifh, by Mr. Mafon, the paffage is as follows:

"Yet deem not, Youths, that perfpective can give
"Thofe charms *complete* by which your works fhall live;
"What tho' her rules may to your hand impart
"A quick *mechanic* fubftitute for *art*,
"Yet *formal, geometric* fhapes fhe draws;
"Hence the true *genius* fcorns her *rigid* laws:
"By *nature* taught he ftrikes th' unerring lines,
"Confults his *eye*, and as he *fees* defigns."

Sir Jofhua's good judgment could not let fuch a paffage pafs without cenfure and amendment, which he has done in exprefs terms, but he might have faid much more, and it remains to be wifhed he had given fuller fcope to his remarks on the erroneous conception and dangerous tendency of thefe verfes. What he has faid is replete with the moft accurate judgment, and is of great fubftance: "Frefnoy, he fays, was not aware that he was arguing from the abufe of the art "of Perfpective, the bufinefs of which is to reprefent objects as they appear to the "eye, or as they are delineated on a tranfparent plane placed between the fpectator

a Mr. Mafon, in an Introductory Preface to his tranflation, addreffed to Sir J. Reynolds, has thefe verfes on Dryden.

When DRYDEN, worn with ficknefs, bow'd with years,
Was doom'd (my friend, let pity warm thy tears)
The galling pang of penury to feel,
For ill-plac'd loyalty, and courtly zeal,
To fee that laurel, which his brows o'erfpread,
Tranfplanted droop on SHADWELL's barren head,
The bard opprefs'd, yet not fubdu'd by fate,
For very bread defcended to tranflate:
And he, whofe fancy, copious as his phrafe,
Could light at will expreffion's brighteft blaze,
On FRESNOY's lay employed his ftudious hour;
But niggard there of that melodious pow'r,
His pen in hafte the hireling tafk to clofe,
Transform'd the ftudied ftrain to carelefs profe.

" and the object. The rules of Perſpective, as well as all other rules, may be " injudiciouſly applied; and it muſt be acknowledged that a miſapplication of them " is but too frequently found *even in the works of the moſt conſiderable artiſts*. It is " not uncommon to ſee a figure on the foreground repreſented nearly twice the " ſize of another which is ſuppoſed to be removed but a few feet behind it; " this, though true according to rule, will appear monſtrous. This error proceeds " from placing the point of diſtance (vaniſhing point) too near the point of ſight, " by which means the diminution of objects is ſo ſudden, as to appear unnatural, " unleſs you ſtand ſo near the picture as the point of diſtance requires, which " would be too near for the eye to comprehend the whole picture; whereas, " if the point of diſtance is removed ſo far as the ſpectator may be ſuppoſed to " ſtand in order to ſee commodiouſly, and take within his view the whole, the " figures behind would then ſuffer under no violent diminution. Du Piles, in " his note on this paſſage,[a] endeavours to confirm Freſnoy in his prejudice by " giving an inſtance which proves, as he imagines, the uncertainty of the art. " He ſuppoſes it employed to delineate the Trajan pillar, the figures on which, " being, as he ſays, larger at the top than at the bottom, would counteract " the effects of Perſpective. The folly of this needs no comment; I ſhall only " obſerve, by the bye, that the fact is not true, the figures on that pillar being " all of the ſame dimenſions:"

" Yet deem not, youths, that Perſpective can give
" Thoſe charms *complete* by which your works can live."

It would be a vain expectation indeed, and ſuch a one as I am perſuaded was never formed, to imagine that linear perſpective could give *thoſe charms Complete by which alone their works* (Painters) *ſhould live*. If their works poſſeſſed no other charm than linear correctneſs, they would be of little value, and not likely to charm, or live long. To look, that Perſpective ſhould find the true contour of regular objects, and aſſiſt in deſcribing irregular ones, is all that was ever wiſely hoped from it, and all that it can impart.

" What tho' her rules may to your hand impart
" A quick *mechanic* ſubſtitute for art."

Theſe verſes are abſolutely devoid of ſenſe; yet it may be perceived what is endeavoured to be intimated. By *art* is meant intuition, or genius; and it wiſhes

[a] Notes by Du Piles, to Dryden's tranſlation of Freſnoy's Poem.

to ſay that intuitive genius is preferable to mechanic ſkill; and that it is better to poſſeſs a fine imagination, even with error, than a plodding correctneſs without taſte.

" Yet *formal geometric* ſhapes ſhe draws."

What has Perſpective, in a general ſenſe, to do more particularly with *formal geometric ſhapes*, than with any other figures? Are the rules and principles of that art applicable only to the Cube, the Titraedron, the Icoſaedron, &c.? Becauſe, in treating expreſsly on this ſubject, it is beſt explained by applying its inſtructive leſſons to regular objects, as being moſt viſibly ſenſible of its influence, is it to be inferred, that when known to its fulleſt extent it ſtill reſts attached an appendage to architecture only, and has no further application? Who ſo concludes has very confined notions indeed of its pervading power, which equally governs irregular as regular objects, and has as much influence in the drawing of the human form, as in drawing a regular piece of architecture, or, as termed by Freſnoy, *formal geometric ſhapes*.

" Hence the true *genius* ſcorns her *rigid* laws:
" By *nature* taught he ſtrikes th' unerring lines,
" Conſults his *eye*, and as he *ſees* deſigns."

That pleaſing flattering word, Genius! what miſchief has it done! and is here given in a very deluding ſenſe, to the undoing of the Pupil, who is hereby led to conceive what he would otherwiſe probably never have had the boldneſs to imagine. Sir Joſhua Reynolds had, no doubt, obſerved many inſtances of the miſguidance of that fatal word; and, in his ſecond diſcourſe, places it in the very light it ſhould ever be conſidered; as a ſomething to be formed and ſtrengthened by reaſon, but not to ſoar beyond it. He ſays, " There is one precept, however, in which I ſhall only be oppoſed by the " vain, the ignorant, and the idle. I am not afraid that I ſhall repeat it too " often. You muſt have no dependance on your own *genius*. If you have great " talents, induſtry will improve them; if you have but moderate abilities, " induſtry will ſupply their deficiency. Nothing is denied to well-directed " labour: nothing is to be obtained without it. Not to enter into metaphy- " ſical diſcuſſions on the nature or eſſence of genius, I will venture to aſſert, " that aſſiduity unabated by difficulty, and a diſpoſition eagerly directed to " the object of its purſuit, will produce effects ſimilar to thoſe which ſome call " the reſult of *natural powers*."

A fine talent by nature will ſtill do little without cultivation ; and it is not an eaſy matter to draw as we ſee. To draw as we ſee, with any tolerable correctneſs, is the reſult of knowledge and long attentive practice; and even then do we ſeldom ſtrike the *unerring* line. According to Reid and other minute inveſtigators of the human organs; ſight is the moſt deceptive ſenſe we have, and particularly requires the aid of experience and judgment. I will now cloſe my remarks on this extraordinary paſſage, which merited not ſo much notice but for the general worth of the whole Poem, eſteemed the moſt brief and juſt in its precepts that ever was penned.

A ſmall treatiſe on painting was publiſhed in 1764 by Count Algarotti, wherein, among various ſubjects, ſeparately treated on, as of conſequence to the compleating a painter's education, is a chapter relative to perſpective ; and ſo extremely judicious are the obſervations, as to the uſefulneſs and neceſſity of a perfect knowledge of that art, and ſo forcibly is it there pointed out, that no thinking Artiſt can read them without being ſtruck with their truth, and determining, if not already acquainted with ſo uſeful an information, to obtain the knowledge immediately. I cannot better ſecond that Author's arguments, they ſo perfectly agree with my own, than by tranſcribing them. He ſays, " The ſtudy of Perſpective " ſhould go hand in hand with Anatomy, as not leſs fundamental and neceſſary. In " fact, the contour of an object drawn upon paper or canvas, repreſents nothing " more than ſuch an interſection of the viſual rays ſent from the extremities of it " to the eye, as would ariſe on a glaſs put in the place of the paper or canvas. " Now, the ſituation of an object at the other ſide of a glaſs being given, the de- " lineation of it on the glaſs itſelf, depends entirely on the ſituation of the eye on " this ſide of the glaſs, that is to ſay, on the rules of perſpective ; a ſcience, which, " contrary to the opinion of moſt people, extends much farther than the painting " of ſcenes, floors, and what generally goes under the name of quadratura. Per- " ſpective, according to that great maſter Da Vinci, is to be conſidered as the reins " and rudder of painting. It teaches in what proportion the parts fly from, and " leſſen upon, the eye ; how figures are to be marſhalled upon a plain ſurface, and " foreſhortened. It contains, in ſhort, the whole rationale of deſign..

" Such are the terms, which the maſters, beſt grounded in their profeſſion, have " employed to define and commend perſpective ; ſo far were they from calling it " a fallacious art, and an inſidious guide, as ſome amongſt the moderns have not " bluſhed to do, inſiſting that it is to be followed no longer than it keeps the high

" road, or leads by eaſy and pleaſant paths. But theſe writers plainly ſhew, that " they are equally ignorant of the nature of perſpective, which, founded as it is " on geometrical principles, can never lead its votaries aſtray, and of the nature " of their art, which, without the aſſiſtance of perſpective, cannot, in rigour, ex- " pect to make any progreſs, nay, not ſo much as delineate a ſimple contour."

All muſt unite in opinion with this informed writer, and agree that the ſtudy of perſpective ſhould go hand in hand with anatomy as being not leſs a fundamental information; he might have ſaid *more* fundamental, for without the aſſiſtance of perſpective, a knowledge of anatomy would be half uſeleſs; as how could any particular exertion of the muſcular frame be expreſſed without juſt delineation? obtainable only from a thorough knowledge of Perſpective. Leonardo Da Vinci was preciſely of the ſame opinion, and in his treatiſe on painting, among numerous pertinent obſervations on the art, he expreſſly ſays, " Thoſe who venture on " the practice, (of painting) without firſt qualifying themſelves in the theory, " are like mariners putting out to ſea without either helm or compaſs, ignorant " what courſe to take. The practice ought always to be built on a rational theory, " of which perſpective is both the guide and the gate; and, without which, it is " impoſſible to ſucceed, either in deſigning, or in any of the arts dependant thereon."

Leonardo Da Vinci wrote a treatiſe ſolely on perſpective; but this, if ever publiſhed, I have never ſeen, but make no doubt, it was confined in its information and principles, comparatively to what is now known and practiſed. Yet was the knowledge of it then thought materially eſſential; in what light would it have been eſteemed, perfected as it is at preſent? My ſubject needed not that I ſhould have quoted opinions in ſupport of its uſefulneſs, but I have choſen thoſe great authorities to corroborate and give weight to my own obſervations on it; for, as Sir Joſhua Reynolds truly obſerves, " we are never ſatisfied with our own opinions, " whatever we may pretend, till they are ratified and confirmed by the ſuffrages " of the reſt of mankind."

It is common to hear it advanced, as an apology for not knowing perſpective, that the ſtudy of it is dry and unintereſting, and that in many caſes it is not to be depended on. Allowance muſt ever be made for difference of taſte and opinion: but with all due deference, I ſhould deem the ſtudy of anatomy much more dry than that of perſpective; yet with what patient application will a ſtudent in painting, emulous of fame, appropriate two, three, four, years of his time to acquire a competent information in that neceſſary branch of his art. I would aſk for what

purpofe is fo much time fpent over fkeletons and anatomized human bodies? The anfwer would moft affuredly be, to be correct in the outlines; and that from a knowledge of the caufes of action and its effects, appropriate expreffion may be given in every pofition, and that, without the aid of a model, and even where a living model would be imperfect, from langour of attitude. If then fuch labour is neceffary to arrive at the knowledge of what *fhould be drawn*, fhould that art be neglected which teaches *how* to exprefs thofe forms, and *how* to tranfmit them to the canvas? The acquirement of the former information is ufelefs without a knowledge of the latter, of which a competent infight might be acquired in three, or at moft in fix, months. That perfpective is not to be depended on, is an unjuft allegation, it is infallible. From injudicious proceeding its delineations may fometimes be diftorted, but that is not to be attributed to the deficiency of the art, but to the want of judgment in laying down the proper preliminaries.

That painter is alfo greatly miftaken, who imagines that prefpective is not equally applicable in the delineation of the human form, as of right lined figures. From a want of it, fhameful enormities are committed; forefhortened limbs made too long, a figure extended on the ground, feet or head foremoft, in a forefhortened pofition, not reprefented its juft length, often twice the length it fhould be, and fometimes thrice, of which I could point out but too many inftances in works, not of inferior artifts. The portrait painter even, frequently fhews his deficiency in perfpective, by making, as the profeffors would fay, his heads out of drawing; the off-fide of the face larger than the near; one eye higher than the other; the nofe not in the middle of the face, when not fo in the original; and like inftances of want of correctnefs in the fight: but he muft not expect to have the compaffes in the eye, who has not long held them in his hand. It may be allowed, that great incorrectnefs is feldom committed, by an attentive, experienced artift; it may be admitted, that the eye by much practice, and nice obfervation, may become fo correct as to render it little liable to great errors; but one twentieth part of the time, by long practice employed to arrive at fuch critical difcernment, fpent in acquiring a competent knowledge of perfpective, would make an artift of genius much earlier, and infinitely more, correct and decifive.

To every painter fome knowledge of Architecture is abfolutely neceffary; he cannot produce the auxiliaries of buildings to his pictures without it; and the higher are his aims the more informed fhould he be in this great aid to his effects. 'Tis lamentable to obferve the deficiency manifefted in this particular, I will ufe the

words of Sir Joſhua Reynolds, "in the works of the moſt conſiderable artiſts," being as well applicable to their deficiency ſhewn in knowledge of architecture as perſpective. Their pedeſtals, their capitals, and baſes of pillars, their architraves, impoſts, &c. from their total want of profeſſional accuracy, expoſes them, with concern I have obſerved it, to the ridicule of the builder's apprentice. The architecture of an hiſtorical piece, or ſubject of a whole length portrait, may not be a firſt-rate object, nor a ſecond, nor a third-rate conſideration; it may be thrown to any diſtance of importance, at pleaſure; all I mean to dwell on is, that it *is* thought proper to *be* introduced, then, if introduced at all, though *kept down* [a] to any poſſible degree next to obliteration, it ſhould be properly delineated, by poſſeſſing the character of the kind of architecture intended to be repreſented.

The French painters, in general, ſhew a laudable attention to their aiding concomitants, be they in what department they will; a fine inſtance, among many, is ſhewn in that truly great performance, the portrait of Lewis XVI. by Callet, where the ſtyle and correctneſs of the architecture, and the truth of the preſpective, are a reproach to moſt Britiſh productions of the ſame nature; which, to be rid of that great trouble, are conſtantly backed by a curtain, or troubled landſcape, or clouded ſky, even when the ſubjects are the portraits of noblemen or ſenators in their robes, or ladies in drawing-room dreſſes.

The ſtudy of perſpective combines that of architecture along with it, becauſe the preciſion of architectural ſubjects moſt obviouſly expreſſes its effects. The acquirement therefore of a knowledge of perſpective has a double advantage, uniting two informations, without the help of which, an artiſt is neceſſarily compelled to wander in uncertainty; and to feel his way, as do the blind, uncertain of their path.

And here I cannot avoid remarking on a new proceeding that has lately been adopted, and is daily gaining ground, as it were to the excluſion of *all neceſſity* of the introduction of architecture, or the effect of perſpective in hiſtorical ſubjects, where it would be a proper and almoſt indiſpenſable requiſite; and this is, the practice of crowding three, five, or ten, or more, Herculean figures into the ſmall compaſs of the frame, ſo crammed upon one another that ſufficient room is not given for action; and the whole appears a ſcene tranſacted in a cloſet, and that of no greater compaſs than from eight to ten feet ſquare; which ſmall extent of platform has been thought, by ſome, ſufficient ſpace for expreſſing the ceremony of a public execution, or grandeur of a coronation.

[a] A technical term of painting, implying dullneſs of tint, ſhunning of inſpection.

In ſcenes of great extent, whether repreſenting tranſactions within or without the walls of a palace, or caſtle, appropriate architecture, well introduced, produces grand effects,[a] as may be ſeen in many of the works of the Roman and Venetian ſchools. Indeed moſt of their great painters were great architects. I could readily draw out a long liſt, but the few following names are of ſufficient authority and celebrity, to inſtance that a combination of the two arts is not at all detrimental to either. Leonardo Da Vinci, Raphael, Julio Romano, Hans Holbien, Vaſari, Paolo Veroneſe, Michæl Angelo, Rubens, Domenichino, Freſnoy.

Many have a notion that perſpective, not only merely relates to architectural ſubjects, but to them ſimply when they are repreſented as receding in the picture, and exhibiting in a ſmall ſpace of a plane placed direct before the eye, the appearance of great depth of ſtructure as retiring farther and farther off, particularly in inſide ſubjects; as looking down the aiſles of churches, long galleries, and the like; in which caſes, the nearer the eye is to being in the plane of the extent looked at, the ſhorter will be the ſpace required in which the depth of the ſubject will be to be delineated, and the greater and more ſudden the apparent convergency of horizontal lines. Such delineations appearing to the not well-informed in the ſubject of delineation, unpleaſing pictures, and not being able to reconcile to their minds, what is, apparently, ſo repugnant to truth, I have heard it obſerved that ſuch ſubjects were too much in perſpective, when it was only meant to imply, that the point of view was taken too cloſely to the plane of the building, to have a ſatisfactory, and pleaſing picture of the object. To ſay any ſubject is drawn too much in perſpective, is tantamount to ſaying, it is too well, or too naturally, repreſented.

Among the various informations and acquirements forming a polite and liberal education, as well of a lady, as of a gentleman, the art of drawing ever did, and

[a] One of the greateſt painters of the preſent day, I know, entertains very juſt, and, I believe, original ideas, as to the applicable introduction of architecture into hiſtorical compoſitions. When the ſubject is of a ſolemn kind, as a funereal or ſacred proceſſion, the architecture, he conſiders, ſhould be of few parts, grave, maſſive, and very little ornamented, with its horizontals in a parallel direction, or nearly ſo, with the picture; in ſubjects of leſs gravity, the architecture may admit of more diviſion, be lighter and more ornamented, and a quicker declination of horizontals may be more congenial; in ſcenes of mirth and feſtivity, the architecture may be ſevered, various, light, and ornamented. To the feeling mind I cannot better inſtance what I underſtand of theſe notions than by drawing a parallel to them from poetry, and Pope's Eſſay on Criticiſm furniſhes me with an admirable one.

> When Ajax ſtrives ſome rocks' vaſt weight to throw,
> The line too labours, and the words move ſlow:
> Not ſo, when ſwift Camilla ſcours the plain,
> Flies o're th' unbending corn, and ſkims along the main,

always will, hold a diſtinguiſhed place. The certain and general principles for attaining that elegant accompliſhment, which perſpective affords, are abſolutely neceſſary to be known, to draw even the ſlighteſt ſketch from nature with precision; and to judge with truth the works of others. The deſire of attaining to great excellence in any art would be conſiderably checked, if there were not to be found admirers ſufficiently informed in their judgment, as to be well able to diſcriminate difference of excellence. The praiſe of having done well, is a powerful inducement to further improvement.

Drawing, in my opinion, is a vehicle of communication among mankind, as neceſſary to be ſomewhat informed in, as the art of writing. The pen may expreſs our ſentiments, but not always our ideas and conceptions; at times, that can alone be done by the pencil. A mechanic is required to execute a new and ſingular piece of work; it is impoſſible he can thoroughly conceive it without a draft, the which, not being able to give, is a ſpecies of ignorance nearly as great as the not being able to write; and a deficiency that many an intelligent perſon has mortifyingly and detrimentally experienced. The moſt laboured deſcription of ſcenes, conveys not half ſo perfect an idea of their form and effect, as a few juſt lines of the pencil. Drawing is an univerſal language, comprehenſible to a very ſavage, and plainly ſpeaks to every eye. No perſon therefore, deſirous of a liberal education, ſhould be deficient in a tolerable acquaintance with the firſt principles of delineation, perſpective.

Few who take upon them the taſk of teaching drawing, are qualified for the profeſſion they engage in. In Landſcape drawing, the pupil is ſet to copy houſes, trees, &c. after a promiſcuous manner, to reſemble as nearly as they are able thoſe of their originals; but without being made acquainted with any fixed principles of delineation in general. They advance from ſimple to complex ſubjects, and, when capable of making a tolerably decent copy in colors, are looked upon to be greatly ſkilful; though at the ſame time they are as incapable of doing any thing original, or of taking a view from nature, as if they never had handled a pencil. They are made to draw ſlant lines to repreſent horizontal ones; to make parallel lines tend to a point of union; ovals to repreſent circles; acute, or obtuſe angles to repreſent right ones; but without being ſhewn the reaſon, or having the cauſe demonſtrated to them, why they do ſo.

It is common for perſons after long inſtruction in drawing, under what are termed able maſters, and after they have obtained great proficiency in copying, to requeſt being informed how they are to take a view; to do which they feel themſelves as

incapable, as would be their pencil without the guide of the hand and judgment. This would not be the cafe had their mafters, from time to time, inculcated the principles of perfpective, by giving familiar objects, as chairs, tables, or other furniture, or fmall models which they might furnifh, to be drawn as they would appear in different places and pofitions; and after defcanting on, and correcting the fketches of them, proceed with their pupils to delineate the fame exactly by rule, from determined ftations. The folid knowledge that would be thus inftilled and ingrafted on the more pleafurable part of the art, would fo deeply fix the whole, as would render it permanent and readily ufeful, whether in copying, compofing, or drawing from actual nature.

The whole of my Theory, if it can be called one, is contained in the introduction. I have there briefly explained the nature of, and how to produce perfpective delineations of given, or known objects, from determined ftations. After the Introduction I proceed to the practice, where, by the cleareft, and fimpleft method that I could devife, I have traced the fubject, in regular progreffion to the end of my propofed defign. To the reflecting mind 'tis needlefs to obferve that the number of examples given might exceed all bounds, were endeavour made at introducing every poffible cafe that might be fuggefted. In purfuance of my plan the moft prominent features only have been the object of my attention; fubordinate ones, and repetition, muft be left to the care and practice of the ftudent.

That I might make this work as ufeful and as compact as I well could, and that it might contain in itfelf every information neceffary to the profecution of the fubject, I have prefaced the practice of Perfpective with fome problems and obfervations on practical Geometry; giving fuch only as are indifpenfibly neceffary to enable the ftudent to draw correctly the fchemes required in the practice of perfpective delineations. This I have done, as I confider it extremely difcouraging, and deftructive of the end required, to tell the reader, who opens a book for fome pleafing and neceffary information, that he has firft fomething elfe to learn, as a prior knowledge, and which is not there to be obtained, before he can comprehend what he is in fearch of, and defirous to know. And this is ftill more repulfive, when probably the fufficiency of fuch prior knowledge is fo trivial, that it could all be expreffed in a few pages; to avoid the little addition of which, the ftudent is turned back, and left to fearch for the mentioned books without guide or direction of how much, or how little of it, it is neceffary he fhould make himfelf acquainted with; a circumftance fo difcouraging as frequently to end in a total neglect of both.

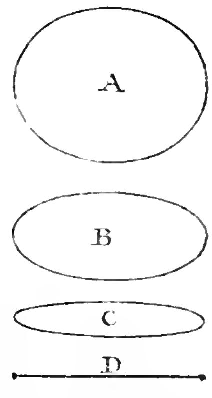
Without a good ſhare of ingenuity and reſolution, 'tis impoſſible to become thoroughly acquainted with any art or ſcience by ſelf ſtudy, from book alone. In the firſt place, what is there ſaid, if not clearly intelligible at firſt, expreſſes but the ſame on a ſecond reading, nor is it placed in any new light on a third; and the ſtudent is left to ponder and work his way, as his genius and his patience ſuits: but let it be obſerved, no information obtains ſo deep a root as that we give ourſelves.

With information and inclination competent to advance, all difficulties will ſpeedily vaniſh, all clouds of darkneſs will diſperſe, and a bright and clear proſpect open to the view; there may indeed a few ſwamps and brambles obſtruct the path and impede progreſs; but theſe I ſhall not only endeavour to remove, but will place ſuch ſtep-ſtones and finger-poſts in the way as will enſure a certain road, and leave little chance of being bewildered, or loſt in a mire. Should my traveller be led unexpectedly into a path apart from the main road, he may reſt aſſured it will be to notice a proſpect by the way that otherwiſe might have eſcaped his obſervation, and that he will be brought a gainer thereby, to the place whence he ſtarted; his mind expanded and eager for further diſcovery. Through the whole I will be the companion of his travels, nor will I enforce my principles by harſh or ſevere means, but uſe him as a friend that I would wiſh to inform. To drop the metaphor, I will do my endeavour to advance ſtep by ſtep unto the end of my purſuit, with a careful attention to the capacity of my ſtudent; advance not any thing I cannot prove, nor leave aught, if poſſible, not clearly explained and inveſtigated. All controverted points I ſhall keep to be diſcuſſed at the laſt, they having nothing to do with true and juſt repreſentation, may be looked into, or not, at the option of the reader; though it does not behove me to paſs them unnoticed.

How far I have ſucceeded in my endeavours at ſimplifying and generalizing my ſubject, the public, who are now become my judges, muſt determine. How far I have juſtly expreſſed my conceptions, or how ſatisfactorily conveyed to others a ſource of great pleaſure to myſelf, I cannot ſay; but of this I am aſſured, that the ſtudy and practice of perſpective may be made as entertaining as any branch of painting whatever, except coloring, and giving relief of light and ſhade, which is the laſt thing a painter has to ſtudy, and which he can never be ſaid to have acquired.

INTRODUCTION.

EVERY thing we ſee is ſeen perſpectively; whether it be a houſe, a man, or beaſt, or tree, or ſhip, or plains, or hills, or water, or all together. It will appear a ſtrange contradiction to advance, but which in a few words I hope to make clear and manifeſt, that no object whatever *appears* as it *is*, in any one point of view; that is, preſents a figure to the eye ſuch as we know it to poſſeſs, but one object alone excepted; which object is a globe. A globe in every point of view, and to every eye at the ſame time looking at it, and in every direction, appears a globe, or ſpherical body bounded by a circular line. Every other object aſſumes, apparently, a different form in every change of poſition, or different point of view whence it is ſeen. A circle, for inſtance, the moſt perfect of plane figures, never appears a circle but in one point of view, and that is, when the eye is perpendicularly over the center of it: in every other ſituation its appearance is an oval, more or leſs extended, the more or leſs the eye is in the direction of its plane; like figures A, B, and C: when the eye is in the direction of the plane of the circle, then is its appearance a right line, as the line D.



Parallel right lines never appear parallel; conſequently a ſquare can never appear a ſquare.

There is no one capable of making ſerious reflection, and of drawing conſequences from certain principles, but muſt be ſenſible and admit, that of two equal heights, one placed nearer the obſerver than the other, that that which is farther off will appear leſs than the one that is nearer. Apparent diminution of ſize, is the reaſon for concluding diſtance of objects: we do not ſcruple to ſay of two men, or of two ſhips, of known equal dimenſions, that one is farther off than the other, becauſe one appears leſs than the other; and that one is much farther off, becauſe it appears much leſs.

This principle being admitted, the confequences take place in every degree of diftance, however great, or however fmall. If the eye of a fpectator be at E, (Fig. 1, Plate 1,) looking at a height, as AB, and an equal height be at CD, farther from the eye than AB, then will the nearer height AB, appear to the eye fomewhat higher than the equal, but more diftant, height CD. For which reafon, parallel right lines, as was before advanced, can never appear parallel, not even when they are direct before the eye, as the lines AB, and CD. Fig. 2. For if the eye be oppofite the middle between the extremes of the lines, fuppofe oppofite the point E, then would the diftance of the two lines at E, as FG, appear greater than the fame height AC, or BD, at the two extremes; becaufe they are equal heights feen at greater diftances. Confequently the parallel fides of a fquare can never appear parallel, nor the figure be feen as it really is: But more or lefs curved, according as the eye is nearer or more remote from the parallel lines regarded.

Now the bufinefs of drawing, that is, of drawing perfpectively, is to delineate things as they appear, in every poffible direction that they can be prefented to the eye; and not as they are, or as we know them to be. Thus of a book, fuppofed placed in various pofitions on a table, as Figs. 3, 4, 5, and 6, which, though all correct delineations of the fame object, are neverthelefs all different in their reprefentations, expreffing the book as feen in as many different pofitions. If a bafon is delineated, as ftanding on a table, it is moft commonly reprefented as Fig. 7, which may be truly its appearance from a certain point of view, and fatisfactorily indicate the real form, in the fituation intended, to moft beholders; yet is neither the bafon, nor the table it is reprefented ftanding on, fuch figures as the table and the bafon are really known to be; for the tops of both are known to be truly circles; yet in their *reprefentations* they are made ovals, and ovals very much extended.

Let a fquare box, which, for particular reafons, we will fuppofe of cubical form, that is, having every fide a fquare, be required to be delineated. It is often fatisfactorily reprefented, as Fig. 8, with one fide a fquare, and the top not in the leaft like a fquare, but which has the appearance of a fquare horizontally fituated. Or a reprefentation may be given, as Fig. 9, with two fides and a top feen, of which one fide only fhall actually be a fquare, the other fide, and top, very different figures, yet appearing the reprefentations of fquares fo placed. Or a cubical form may be reprefented, as Fig. 10, when neither fide nor top fhall be actual fquares, yet all do appear as fuch, and the whole together conveys a juft idea of the object intended to

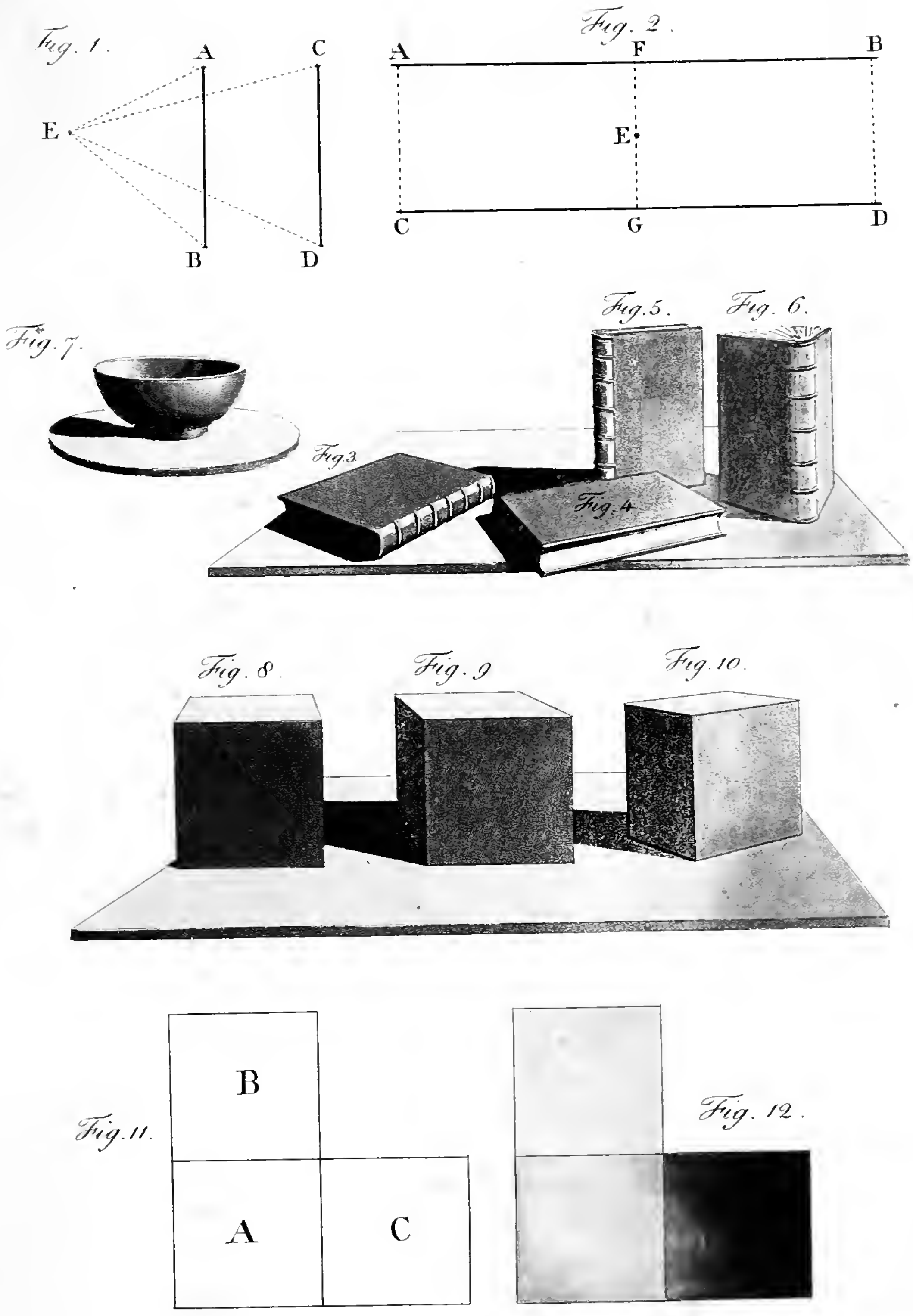


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PLATE 2

Fig. 1.

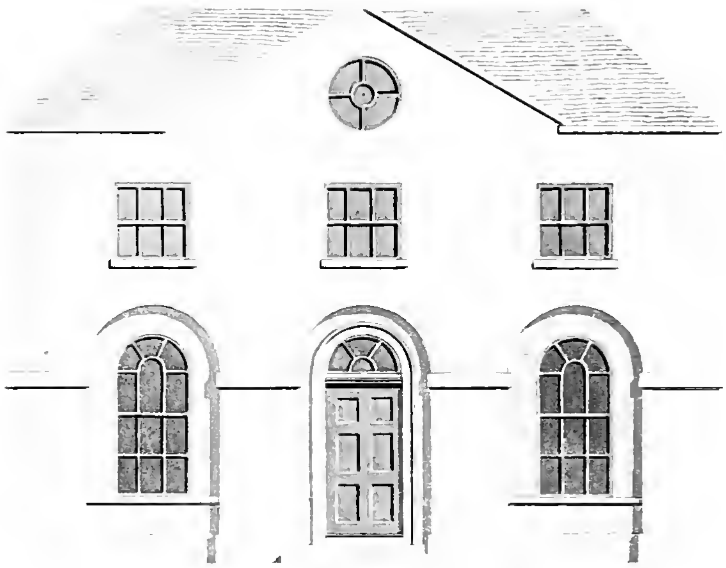


Fig. 2

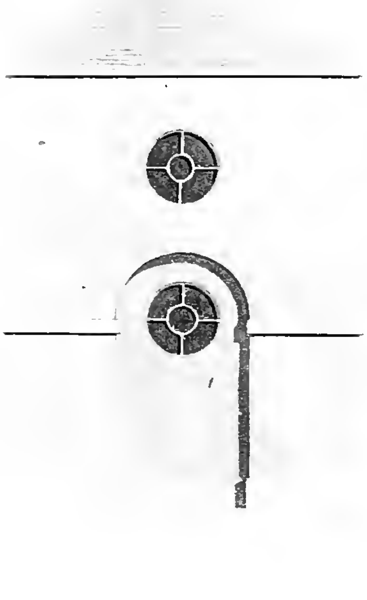
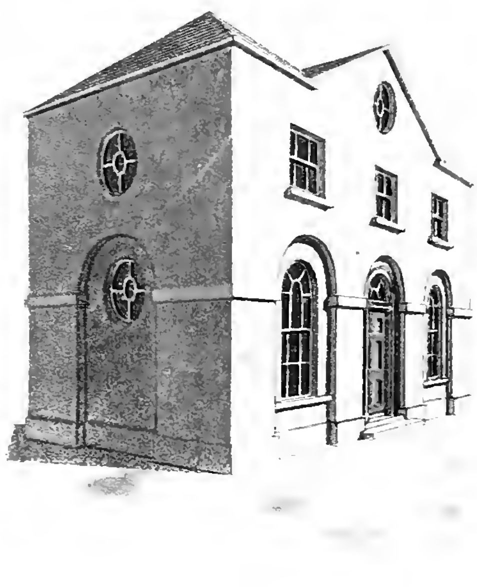


Fig. 3



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be repreſented: and notwithſtanding the three delineations differ ſo eſſentially from each other, yet do they all, and each, convey the idea of the ſame form, but differently poſited.

Now this effect could not be obtained, by making the repreſentation of each ſide of the object ſeen, a ſquare, the better to indicate a ſquare; for ſuppoſe one only ſo repreſented, as A, Fig. 11, (and one only, of the ſame object, can be truly ſo) the top, B, will not appear a ſquare as placed horizontally, and at a diſtance from you, by being made a ſquare; neither will the ſecond ſide, C, appear a ſquare, as placed at right angles with the other, by being made a ſquare; but altogether will have the appearance of three ſuperficies, all in a vertical plane, and have no ſemblance of a ſolid body; not even when aſſiſted with the effect of light and ſhade; as Fig. 12. for the linear delineation not affecting the eye as the contour of a ſolid body, the three ſquares will appear but as one ſuperficies, variouſly ſhaded.

What has been ſaid of the above particular figures, may be applied to *any* and to *every* figure: a man, a tree, a ſhip, or any form that exiſts. Thus when a man is repreſented with one leg longer than the other, or one arm longer than the other, it is not to be inferred from thence that one leg, or one arm, becauſe not drawn at full length, is meant to repreſent an arm, or leg, ſhorter than the other; but that the leg or arm ſo repreſented, is ſeen, as painters expreſs themſelves, foreſhortened, or contracted in its manner of preſentation to the eye; and ſo of every different poſition. A tree, in one point of view, ſhall appear of very different figure to the ſame tree in another point of view; ſo of a ſhip; and ſo of every object of art or nature.

It is really ſtrange, though not unaccountable, that though we *never* ſee objects as they *are*, but always as they *appear*, that is, perſpectively; yet in drawings of houſes, what are termed geometrical drawings, appear, to the many, to be the moſt ſatisfactory repreſentations of them.

For the ſatisfaction of the uninformed in this particular, I will briefly explain the difference that ſubſiſts between theſe two modes of repreſentation, geometrical and perſpective; that the terms geometrical and perſpective drawing, may be immediately and clearly underſtood in future on the mention; and after a few obſervations thereon, proceed with my ſubject.

By a geometrical repreſentation, as of a houſe for inſtance, is underſtood, that the whole, and every part of it, is drawn according to the ſtrict rules of geometry: that is, that every circle be drawn a true circle; every ſemi-circle a true ſemicircle; every ſquare be made a true ſquare, with its oppoſite ſides parallel, and its angles right ones; and that all parallel lines, in every direction, be really made

parallel. Under all which agreements, Fig. 1, Plate 2, is a geometrical elevation of a houſe, wherein may be obſerved that the circles are true circles; the ſquares are true ſquares; that all its windows, intended to be equal, are made equal and alike; and that all horizontal and vertical lines are ſtrictly parallel to each other. Fig. 2, is the geometrical elevation of the end of the ſame building. Such delineations are what are termed geometrical drawings, and are ſuch as are implied when reference is made, in this work, to drawings of objects *as they are*.

A perſpective drawing of a houſe, is the repreſentation of a houſe as it appears, when viewed from any particular ſtation. Fig. 3, is a perſpective repreſentation of the before-explained geometrical drawings, in which it may be obſerved that there is no one figure delineated like unto the originals of which they are the repreſentations. Circles and ſemi-circles are repreſented by ovals and half ovals; ſquares are deſcribed of the figures of lozenges, or more properly of trapeziums; none of their angles are right ones, ſome being very obtuſe, and others very acute; none of its parallel lines, except the vertical ones, are parallel; neither are any two of its correſponding windows of a ſize, though intended to repreſent equal and alike windows. And though this be the univerſal language of nature, and the only preſentations ever offered to our eyes, yet are they not ſo well comprehended in general as are geometrical delineations; which, though it may appear paradoxical to aſſert, are abſurd delineations, and no repreſentation of any real object at all.

I would not have it ſuppoſed that I mean to imply, there is no utility in geometrical drawings; my meaning here is, only relative to their not being repreſentations of exiſting forms as they appear.

Now though geometrical appearances, in real objects, *never* can be ſeen, and perſpective ones always *are* ſeen, yet do the firſt, in repreſentation, ſeem more ſatisfactory to the untutored eye than the other; which, overlooking the appearance of objects, immediately reverts to the thing ſignified; and knowing that houſes in reality are equally high at their extremes, and that their tops are level, and parallel to their bottoms, immediately conclude the former to be true repreſentations, and the latter erroneous conceptions, which, though frequently committed, cannot be defended or accounted for.

If it be poſitively true that theſe irregular figures take place as the repreſentations of others of truly regular forms, is it to be concluded there is ſome determinate preciſe form of repreſentation, from certain conſequences? or is it all random work, and left to the guidance of the eye and reaſon only? The whole is governed by rule, and there is a determinate mode of procedure, upon infallible prin-

ciples; by which, knowing the plan and form of the object, and diſtance and height of the eye that views it, a perfect delineation ſhall be effected; which may ſo impoſe upon the eye, as to be miſtaken for the object itſelf. I will now enter on this important ſubject, but previouſly it will be neceſſary to explain ſome introductory matter, upon which the certainty of effecting this deſirable end is grounded.

The truth of perſpective repreſentations depends upon an eſtabliſhed and certain principle in optics, *that viſion, through the ſame medium, is conveyed in right lines to the eye.* If the attention of the eye be directed to any particular ſpot, it obtains its perception, by a ray of viſion, or of light, extending in a right line between the object and the eye: thus, the eye at E, fig. 1, upon looking at the point A, forms, what is termed in optics, a ray of viſion, or viſual ray, EA, extending in a right line between the point of obſervance and the eye; which line of viſion it is contended, is a right line; and ſhould any other object, as B, intervene between the firſt point, A, and the eye, ſo as to touch the viſual ray, it would effectually hide the point A from view of the eye at E. To prove that a ray of viſion directed from the eye to any particular point, is a right line, and not a curved one, as ECA, the following ſimple experiment may eaſily be tried, which, anſwering, will inconteſtibly eſtabliſh the fact. Place any height, as AB, (Fig. 2.) before the eye, at E; half way between the ſight and the firſt height AB, place a ſecond height, as CD, ſo placed, that the other may be ſeen immediately behind it. Then directing the eye to the bottom of the object, mark the place where it will appear (which it will do) to touch the firſt height, as at *b*; then direct the eye to the top of the far object, and mark where it will appear to touch the firſt height, as at *a*; then if the ſpace comprehended between *a* and *b*, be but half the height of AB, it will be clear that the viſual rays EA and EB, directed from the eye at E, to the points A and B, are right lines.

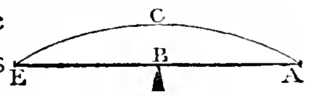
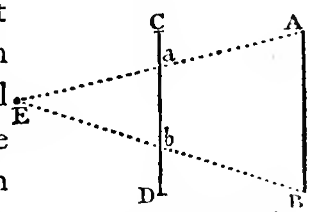


Fig. 2.



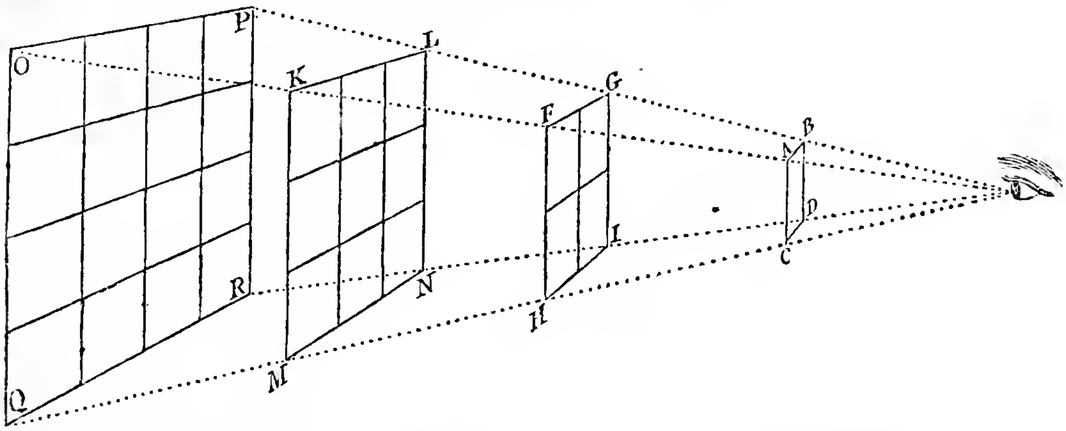
To my reader converſant in geometry, further proof need not be given of the certainty of the viſual rays EA and EB being right lines, than has juſt now been ſtated. The line *a b* is half the line AB, but the line AB is parallel to *a b*, and twice as far from the point E; then will the lines E *a* A, and E *b* B, be right lines, and the triangles E *a b*, and EAB, be ſimilar.

It would be entirely foreign to the purpofes of perfpective, to enter more on the fubject of optics; the eftablifhment of this fingle fact, paves the way to the certainty of all delineation on planes. To prove that rays of vifion are fubject to refraction, as they pafs through mediums of different denfities, would be entirely irrelevant to the prefent purfuit, which has only one medium of optical pervicity under confideration, Air; and to that alone we are to be confined. Neither would it be of any account to the prefent inquiry, to inveftigate the nature or effence of light; for whether it is material, or immaterial, is perfectly unimportant here. On fuch points of contention it is neither my province, nor my inclination, to dwell: it only regards the fubject in queftion to eftablifh, not by what *means* vifion is performed, but, that it *is conveyed in right lines from the eye*, the eye and the object being in the fame medium of light; of which I hope demonftrative, but of which I am certain, (the enquiry anfwering the propofition) practical, proof has been given.

On the certainty of the direct procedure of the vifual rays from the eye, it is, that we are capable of calculating the exact apparent dimenfions of objects, as they are more and more remote from us. Not that this calculation is of any particular fervice in perfpective delineations, but only as it obtains inconteftible proof of what otherwife might remain doubtful, the exact proportion of diminution that does take place; and which is, *in the inverfe ratio of the fquares of their diftances from the eye that regards them.* If an object be at a certain diftance from the eye, it will appear four times the dimenfions of an equal object feen at twice that diftance; nine times the dimenfions of an equal body placed at three times the diftance; fixteen times as large as an equal body at four times the diftance; and fo on, inverfely as the fquares of the diftances; that is, inafmuch as the fquares of the diftances increafe, in the fame ratio do their apparent magnitudes diminifh.

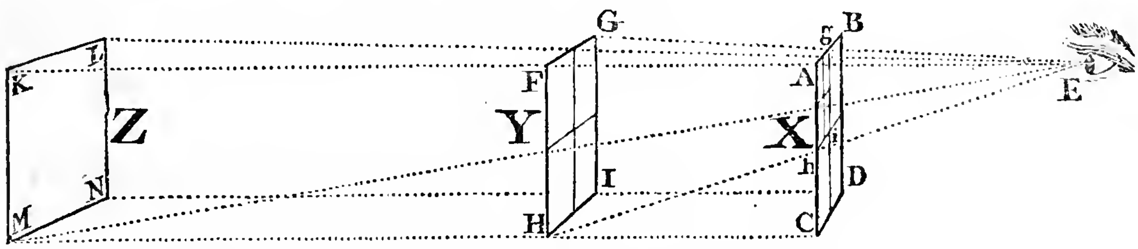
If a fquare, as ABCD, be placed before the eye, it will cover, and hide from view a fquare of four times its dimenfions, at twice the diftance, as FGHI: confequently, an equal fquare, at twice the diftance, will appear but a fourth part the dimenfions of the firft, as any one of the four fquares marked on FGHI. The diftance is 2, the fquare of which is 4, the inverfe then is only a quarter, or a fourth part. At three times the diftance of the firft fquare from the eye, it will cover a fquare of nine times the dimenfions, as KLMN; of confequence an equal fquare there, would appear but a ninth part the fize; the fquare of 3 being 9, the inverfe of which would be but a ninth part. At four

times the diſtance, it would hide a ſquare of ſixteen times its dimenſions, as the ſquare OPQR, determining an equal ſquare there placed, to appear but a ſixteenth part its ſize; the ſquare of 4 being 16, the inverſe is but a ſixteenth



part. So the proportion, or ratio, would go on to infinity, agreeably to the inverſe of the ſquares of the diſtances; if at five times the diſtance, but a twenty-fifth part; and, if at ten times, but a hundredth part.

Probably the inveſtigation of this curious circumſtance may be aided by an examination of the following diagram: where



are three equal ſquares, X, Y, and Z, placed direct before the eye at E, each having one corner touching the ſame viſual ray to the eye, K F A E; of conſequence, being all vertical, and parallel to each other, their tops and near perpendicular ſides, are all in the ſame planes of viſion. The ſquare Y being twice the diſtance from the eye at E, that the ſquare X is, appears, to that eye, but a fourth part the dimenſions of the firſt ſquare; as is manifeſt by the viſual rays FE, GE, and HE, which paſſing the plane X, touch it in the points A, g, and h, determining the ſquare A g h i, as its apparent magnitude, when compared with the ſquare X; which ſquare A g h i, is but a fourth part the ſquare X; for the line A h, is but half the line A C, and A g, but half A B; of conſequence then the ſquare A g h i, is but quarter of the ſquare A B C D, or ſuper-

ficies X. In the ſame diagram, the ſquare Z is four times the diſtance from the eye that is the ſquare X; on which account its apparent dimenſions are, when compared to the ſquare X, but a ſixteenth part of the ſquare X, as is clearly evident by the viſual rays K E, L E, and M E, which, interſecting the ſquare X, determines thereon, a ſquare equal a fourth part of the ſquare A g h i, and conſequently but a ſixteenth part of the ſquare X; an apparent diminution agreeably to the proportion intimated, being *inverſely as the ſquares of the diſtances.*

DEFINITION

1. A Visual Ray. Is an imaginary right line extended from the eye, to any particular point, the object of the eye's regard, or contemplation.

It is curious to obſerve the play of the eye, while it is employed in minutely ſurveying any particular object, or objects; to remark its gradual ſhiftings as it changes the immediate ſpot of contemplation to the regarding of another, or others. It will naturally reſult from this conſideration, and the knowledge of viſual rays being right lines, that no two ſpots can be ſo near, but that the direction of the eye will be changed, and a new viſual ray be formed, in the ſeparately examining the one and the other. Obſerve but the dial of a watch; and the motion of the ſhifting of the eye will not only be felt as it paſſes from regarding one hour to another, but it will be ſenſibly felt as it glides by the minutes; evincing in its progreſs a ſubtlety of motion, ſuperior to the mechaniſm of the delicate machine it contemplates.

From the ſhifting of the eye, while employed in examination of any object, or number of objects, it may be figured that while contemplating the borders of a circle (as the minutes of the dial of a watch), there would be generated a cone of viſual rays, of which the eye is the apex, or point, and the dial the baſe; as Fig. 1, Plate 3. And it muſt of courſe be reflected, that, as the objects of contemplation differ in figure, ſo muſt vary the body of the collection of rays proceeding from the eye in their examination. As, ſuppoſe the object a ſquare ſuperficies, ſee Fig. 2. then will there be generated a pyramid of rays; if it be a triangle, then is there another pyramid formed, having a triangular baſe, as Fig. 3; or, the object being a ſolid, as Fig. 4; or the figure may be a man, or beaſt, as Figs. 5. and 6. it matters not what, on the eye's regarding them all around, there will be formed a body of viſual rays, of which the contour of the object regarded, be it what it will, is the baſe, and the eye the apex.

PLATE 3

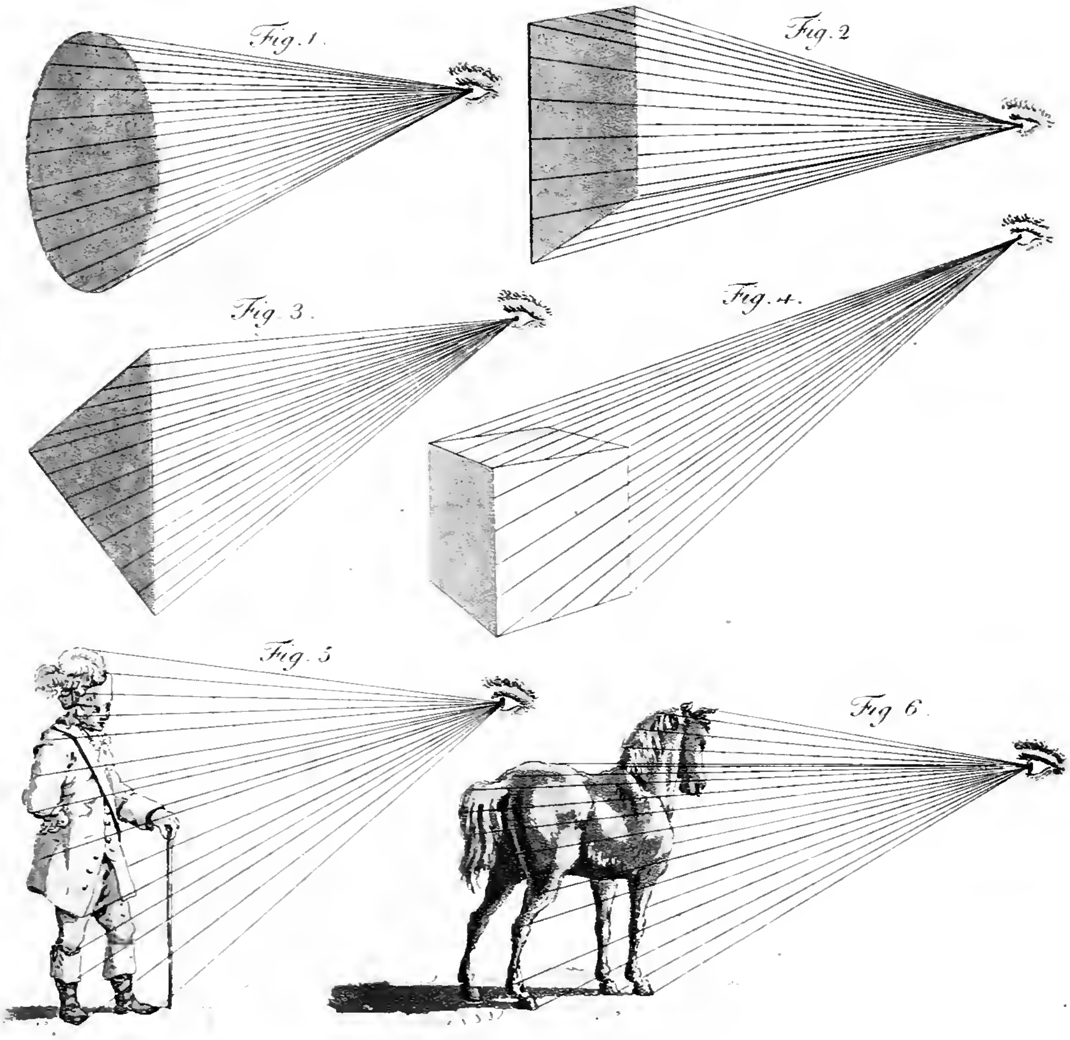


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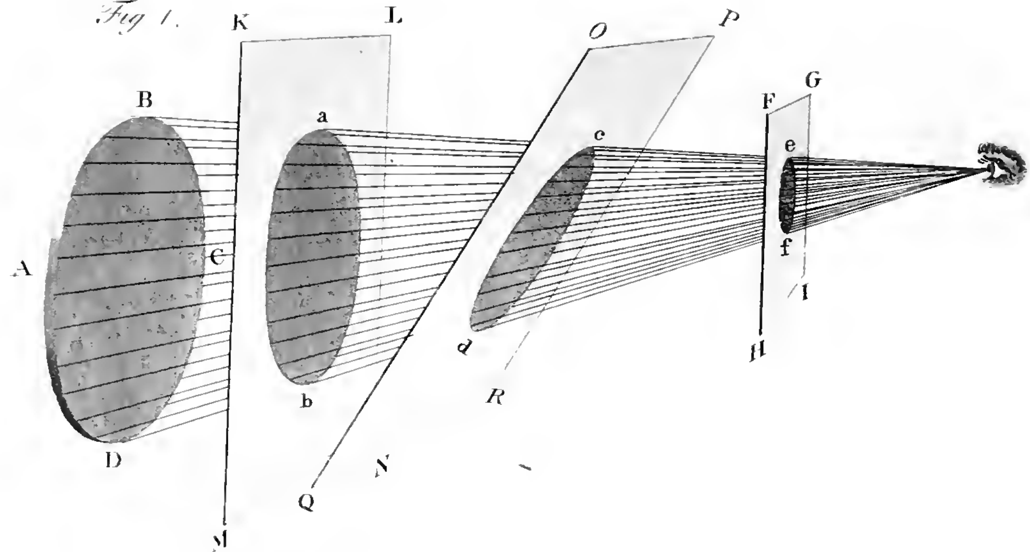
PLATE 4

Fig 1.



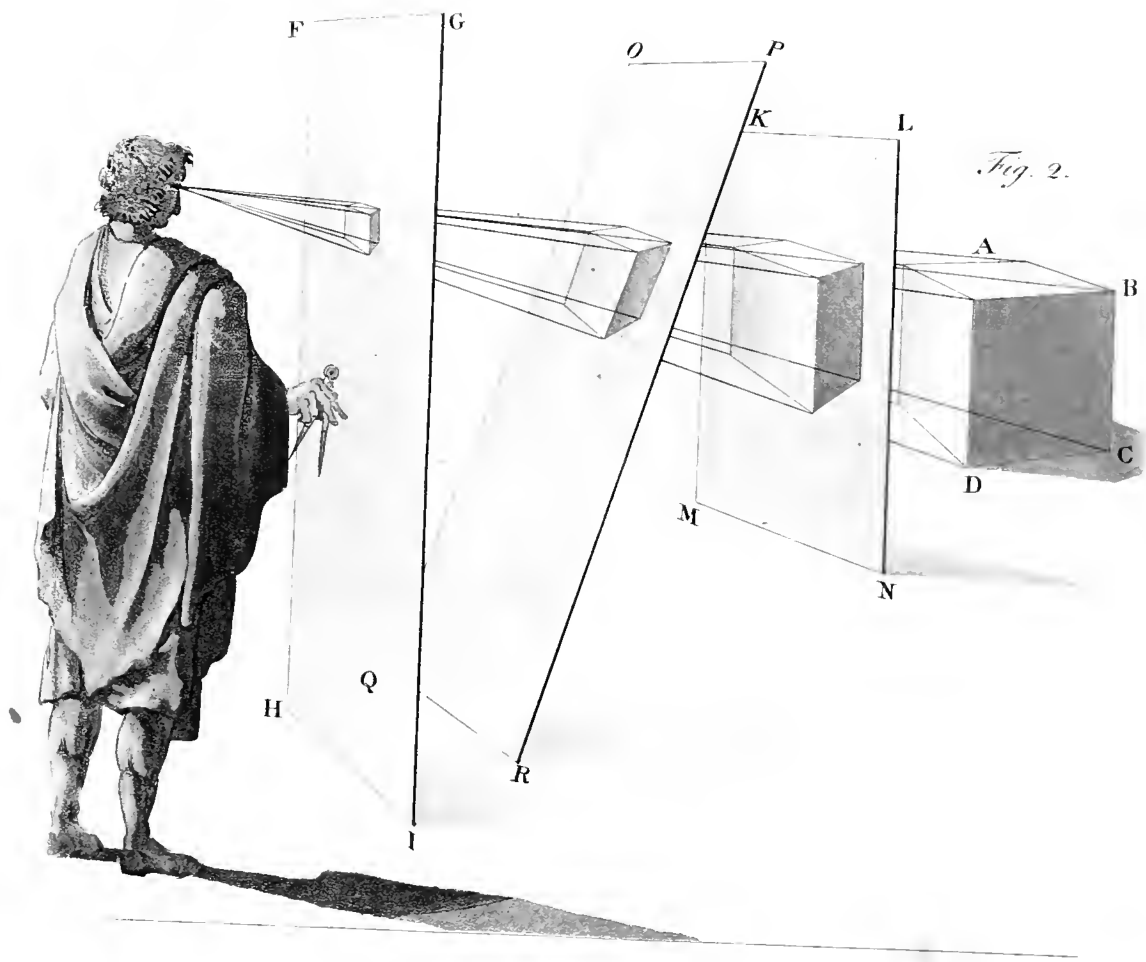


Fig. 2.

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DEFINITION

2. VISUAL RAYS. Are any number of imaginary right lines proceeding from the eye, to any object the subject of its contemplation.

If the pyramid of visual rays proceeding from the eye while contemplating an object, be cut by a plane making a section of those rays, the figure that would be generated on the plane by such section, would be what is termed a perspective representation of that object; which section would be varied in figure and in dimensions, accordingly as the plane making it, was inclined one way or another, and accordingly as it was taken nearer the eye, or nearer the object. Parallel sections would be similar figures, and all otherwise than parallel, dissimilar.

Thus of the cone of visual rays, proceeding from the circle ABCD, Fig. 1. Plate 4; the section e f, made by the plane FGHI, being nearer the eye than a b, made by the parallel plane KLMN, the former figure, though similar, is smaller; and the section c d, made by the inclined plane OPQR, is different in figure from those made by either of the two vertical planes. So of the pyramid of rays proceeding from the cube *ABCD*, Fig. 2; the sections made by the parallel planes *FGHI* and *KLMN* are similar, but differ in size from each other, and in figure from that made by the plane *OPQR* on account of its inclined position.

DEFINITION

3. A PERSPECTIVE DELINEATION. Is a linear representation of any object or objects, as they appear to the eye that regards them: and is such a figure as may be supposed to be made by a plane making a section of the body or pyramid of visual rays directed from the eye to the objects, while contemplating of them. Which delineation, being so tinted as to resemble the local colours of the real objects, and having the effect of light and shade, will convey a lively idea of the real objects, and at the same time indicate their position and distance from the eye of the observer.

A Perspective representation of any object, or multitude of objects, is such a representation as would appear to be made on a plate of glass, placed between the eye, and the object or objects of examination. A view seen through the window of a room, is, as it appears on that window, a perspective representation of that view; and if the sight could be kept confined, and the hand at the same time were to trace the figures of the objects on the glass, where they appear to touch it, the picture so drawn upon the glass, would be a perfect perspective view of the prospect behind it.

It muſt however be obvious, that every change made in the place of the eye, or the poſition of the tranſparent plane, muſt make a difference in the figure and dimenſions of the ſection of viſual rays; if the plane of glaſs be placed near the eye the ſection will be ſmall; and as the glaſs is removed nearer to the object, the ſection, or repreſentative figure, will proportionably increaſe: alſo, the plane of glaſs may be ſo poſited, as to produce very diſtorted figures indeed, but of that in another place.

Inclined ſections of the pyramids of rays, that is, not vertical ones, are ſometimes taken, as ſubjects of curioſity; but ſeldom as objects of utility. As ſubjects of pictures they are univerſally vertically taken, and, until the concluſion of this work, when ſpecially treating on ſuch ſubjects, they will uniformly be ſo conſidered.

Suppoſe, while the eye is fixed looking through a ſight-hole as at E, (Fig. 1, Plate 5.) at an object, as A B C D F G, a plate of glaſs were placed vertically between the eye and the object; as the plane H I K L. And ſuppoſe the face of the plane of glaſs, towards the eye, to have been finely duſted over with hair-powder; not ſo as to render it impervious to the ſight, but ſo, that the objects might nevertheleſs be diſtinctly ſeen through it. Keeping the eye fixed at the ſight-hole, a ſteady hand could then trace on the glaſs the contour of the object, as it would appear through that glaſs, and would mark the figure *a b c d f g*.

Now it is the buſineſs of the rules of perſpective to find ſuch figure, on an opaque ſurface, as paper, from ſome certain data given or known, as would, when obtained, and properly placed between the object and the eye, affect the eye the ſame as the one traced on the glaſs; for the proof of which, the figure being out, the real object ſhall exactly appear through and fit the aperture; as in Fig. 2, the object does, through the aperture *a b c d f g*, to the eye of the obſerver at E.

Having the two extremes of a right line, the whole line is obtained, by drawing it from one extreme to the other; therefore to find the perſpective of the figure A B C D F G (Fig. 3.) it is only neceſſary to find the points of interſection of the viſual rays E A, E B, E C, E D, &c. from the viſible angles of the object, as they would pierce the plane H I K L, in the correſponding points *a b c d f g*, the lines then being joined together, in their reſpective directions, as is there done, the whole figure is obtained, which is the repreſentation of the contour of the object required to be delineated.

Thus, I hope, I have clearly ſhewn what is *meant* by perſpective repreſentations. I will next proceed to trace a ſimple method by which they may be *obtained*, and at the ſame time will endeavour to explain the infallibility and truth of the proceſs.

Fig: 1.

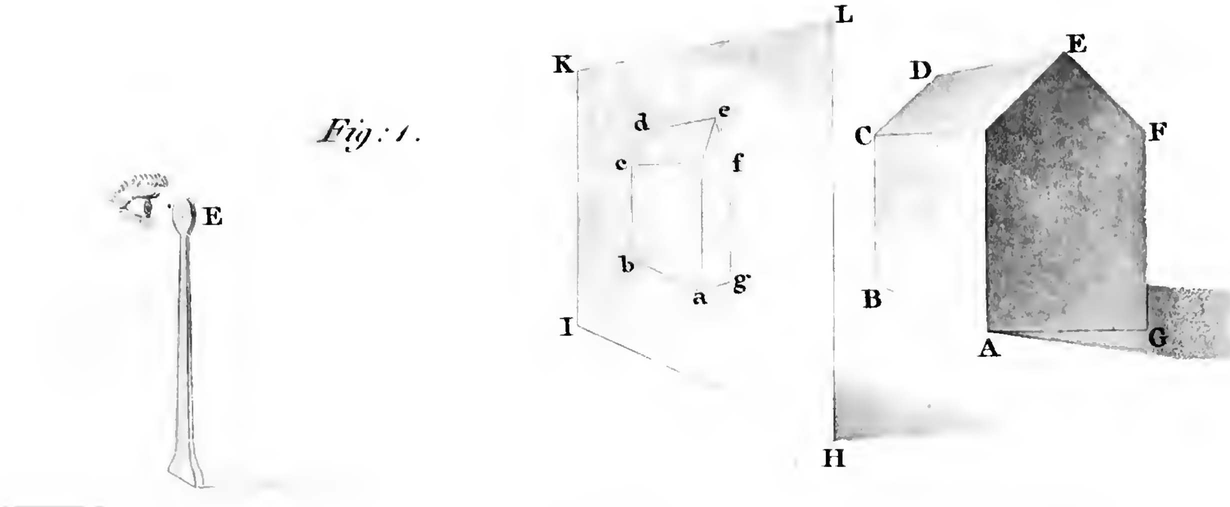


Fig: 2

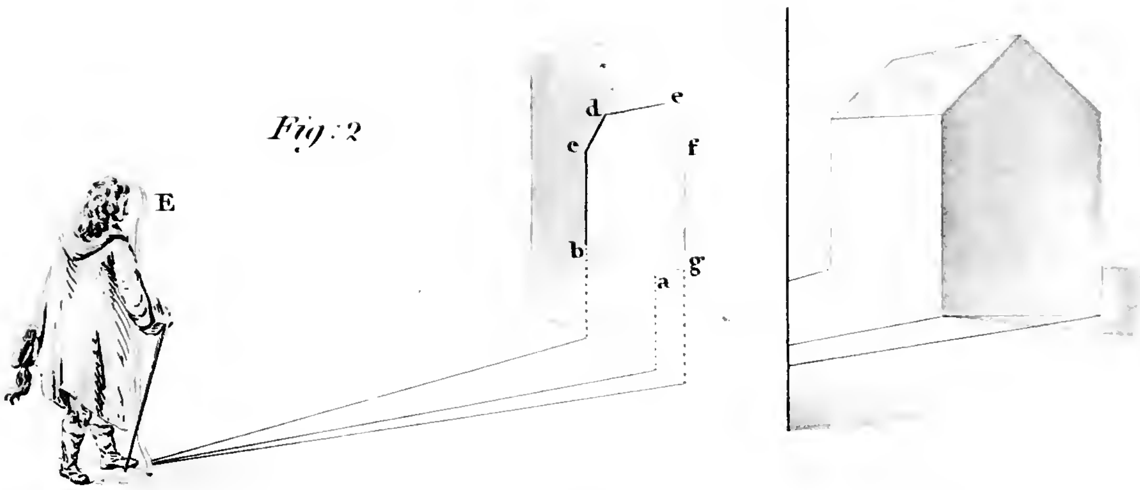
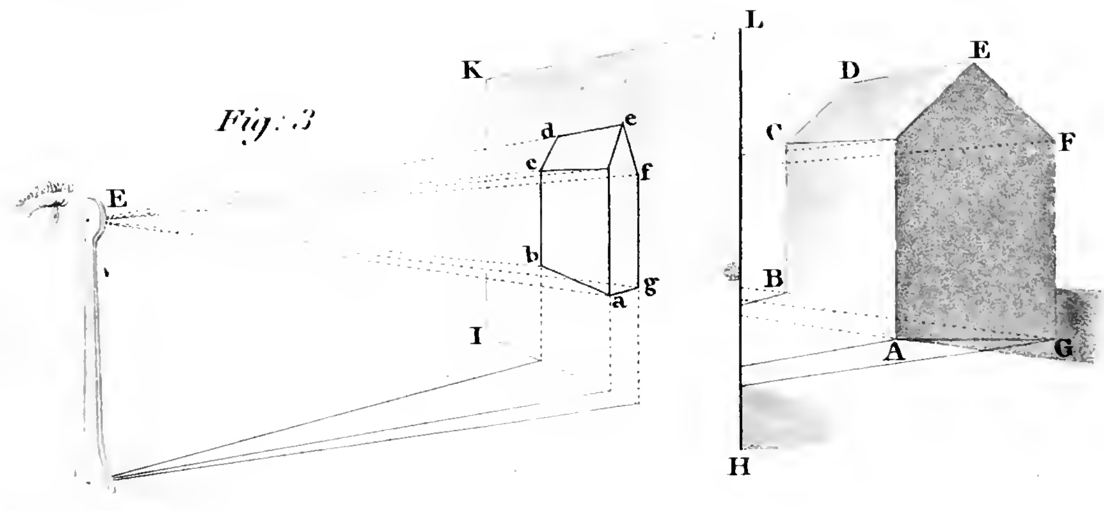


Fig: 3



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As it is certain that the apparent figure of every object is changed by any variation of the place of the eye, ſituation of the object, or poſition of the intervening plane on which the repreſentation is required; it of conſequence follows, that to give a perſpective delineation of any object, the POINT OF VIEW muſt be fixed, the poſition and place of the PLANE OF DELINEATION muſt be determined, and the ſituation and dimenſions of the ORIGINAL OBJECT, known. With this data premiſed, a perſpective delineation of any object, or multitude of objects, may be obtained, with ſuch certainty and correctneſs, that the figures drawn, being cut out, and the plane on which they are delineated, fixed in its ſtated place, the original object or objects would be found to fit and fill the aperture, without the ſmalleſt poſſible variation.

DEFINITIONS.

4. POINT OF VIEW, or POINT OF SIGHT. Is the fixed place of the eye of the Obſerver, viewing the object or objects to be delineated.

5. PLANE OF DELINEATION, or PICTURE. Is the plane of canvaſs, or paper, upon which the delineation is made, or intended to be drawn.

6. ORIGINAL OBJECT, or OBJECTS. Is any object or objects, to be drawn; as a houſe, a ſhip, a man, or all, or many of them, together.

7. ORIGINAL LINES. Are any lines that are the boundaries of *Original Objects*, or of planes in thoſe objects.

8. HORIZONTAL PLANES. Are any planes placed truly level; that is, to which the gravity of the plumb-line is truly perpendicular.

The floors, cielings, &c. of every houſe are endeavoured to be made horizontal, and are always ſo conſidered in perſpective delineations of regular Buildings.

9. HORIZONTAL LINE. In perſpective, is a line on the *plane of delineation*, level with the eye of the obſerver or *point of view*; and is ſuppoſed obtained by an horizontal plane paſſing through the eye of the obſerver, produced till it cuts the *plane of delineation.*

10. VERTICAL PLANES, Are planes perpendicular to *Horizontal Planes*.

The upright walls of a houſe, its doors, windows, &c. are always conſidered to be truly vertical, being ever endeavoured to be made ſo.

Let it be required to find the perſpective repreſentation of a cube, ſuppoſed placed perpendicularly over the ſquare A B C D, Fig. 1. Plate 6, as it would appear on a plane of glaſs ſtanding vertically on the line G L, to the eye of an obſerver, elevated one inch and a half over the ſtation point, S.

Draw S G parallel to A B, and S L parallel to A D; alfo draw the vifual rays S A, S B, S C and S D; produce the line B A till it touches the line G L in the point I, and draw S O perpendicular to G L. Then, on a plane of paper or canvafs as GHKL, Fig. 2, draw a line VZ, parallel to GL, and make it one inch and a half above GL; VZ will be the horizontal line. Mark a point at V, and another at Z, as far diftant from each other, as are the points G and L in the plan, Fig. 1. Take the diftances G *a*, G *b*, G *c* and G *d*, where the vifual rays interfect the line G L (Fig. 1.) feverally in your compaffes, and mark them off on the line V Z (Fig. 2.) at 1, 2, 3, and 4, and draw fine perpendicular lines through the points. Take the diftance G I (Fig. 1.), and mark it off at V I (Fig. 2.) and draw a vertical line through the point I; upon which line mark the height of the cube, equal to the length of one of its fides, in the plan, as O P. Then are all the neceffary fteps taken for obtaining the reprefentation required; which is done by drawing the lines O V and P V (Fig. 3.) *a* Z and *e* Z; *f* V and *c* Z, cutting each other in the point *d*, and completing the figure *a b c d f g*. Which figure will be the reprefentative figure of a cube, as it would appear to an obferver regarding it fituated on the fquare A B C D, (Fig. 1.) whofe eye was one inch and a half above the point S.

If the drawing upon the plane G H K L (Fig. 3.) was placed perpendicularly over the line G L, as is done (Fig. 4.) by turning the moveable plane G H K L upright on the line G L, the relation it then has to the ground plan will be more clearly difcernable, and the united operations and coincidence of both, more readily feen; and where it may be noticed that were the figure *a b c d f g* cut out, a folid cube ftanding on the fquare A B C D, would appear exactly to fit the aperture, to the eye of a perfon elevated, one inch and a half over the point S, with his eye oppofite the point O in the horizon.

DEFINITIONS.

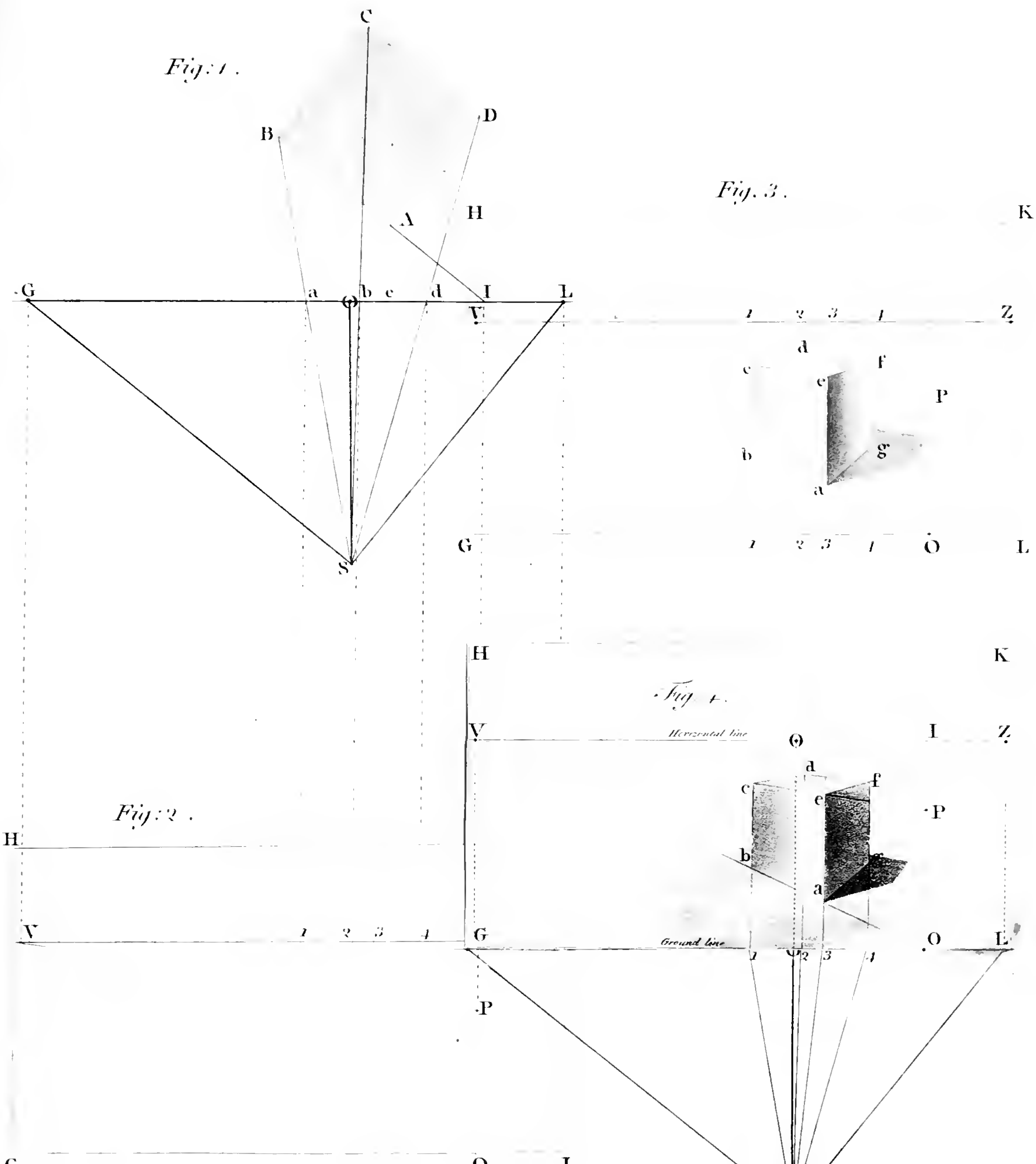
11. GROUND PLANE. Is the plane upon which the *Objects* to be drawn are placed; as alfo whereon ftands the *Obferver* and *Plane of Delineation.*

N. B. The *Ground Plane*, in perfpective enquiries, is confidered an infinitely extended level, or horizontal, plane.

12. GROUND LINE. Is the line in which the *Plane of Delineation* refts on the *Ground Plane.*

13. STATION POINT. Is a point on the *Ground Plane* perpendicularly under the *Point of Sight*, or *Point of View.*

In the procefs of perfpective delineations, the horizon, or horizontal line, is a confideration of the greateft importance, inafmuch, as it regulates



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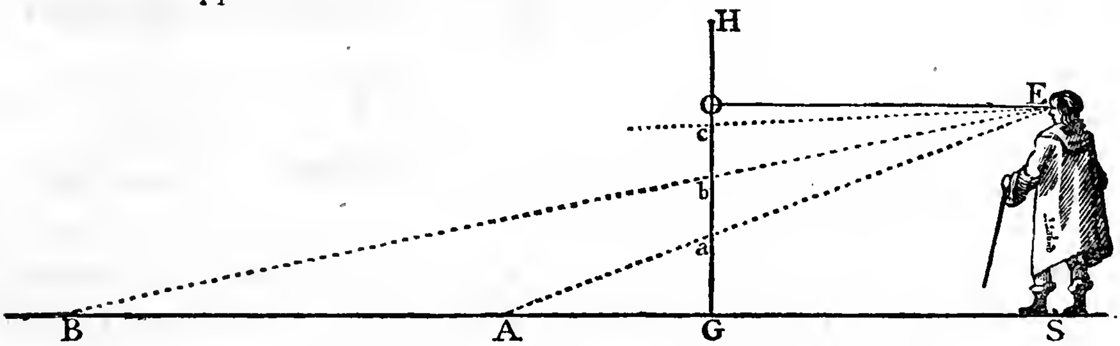
and governs every part of the work, whether it be the reprefentation of buildings, or human figures, or both, or with numerous other objects combined. Accordingly as the *horizontal line* is placed higher or lower, does the drawing of the whole picture vary, the entire of the work being governed by it.

Between the *Horizontal line* and the *Ground line,* or bottom edge of the Picture, is comprehended the reprefentation of infinity of level ground; that is, were the *Ground plane* to be infinitely ftretched out, beyond the plane of delineation, it would all appear under the horizontal line.

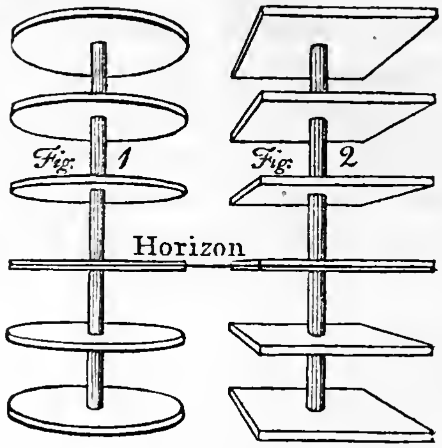


Let the line A S reprefent a fection of the ground plane; and let G H reprefent a fection of the plane of delineation; let E be the place of the eye of an obferver; S will, of confequence, be the ftation point. Draw the line E O parallel to A S, cutting the line of the picture G H, in the point O, the place of the Horizontal line; *then will the fpace between* G *and* O, *on the picture, or plane of delineation, be the reprefentation of the level ground plane, continued infinitely towards B, beyond the plane of the picture.*

The fpace of ground from G to A, is a certain diftance; by drawing the vifual ray A E, the plane of delineation is cut in the point *a*, giving the fpace *a* G for its reprefentation on the picture. Suppofe the reprefentation of a greater length were required, as G B; the vifual ray B E being drawn, determines and gives *b* G for its reprefentation on the picture; and fo on of any length that might be required, it would always be obtained by drawing a vifual ray from the diftance defired, to the eye, cutting the picture; but no point on the ground line could be fo far diftant, that a vifual ray from it could fall in with the line O E, becaufe the line O E is parallel to the ground line. Did the line of vifual ray, as E *c*, differ but ever fo little from the line O E, it would if produced, fomewhere cut the ground line S B, lengthened out; but no point, however far diftant, could be affumed in the ground plane, that a vifual ray from it could fall in with the line O E; becaufe two parallel lines, though produced infinitely, could never meet;

wherefore the ſpace between G and O, as was advanced, comprehends the repreſentation of infinity of level ſpace under the horizon.

When any level plane is below the horizon, then the top of it is ſeen; the more it is depreſſed below the horizon, the more is its true figure diſcernable; as alſo will be the caſe the more it is elevated above the horizon; and when a level plane is in the plane of the horizon, then is its appearance but a right line; as is expreſſed in Figures 1 and 2.



From what has been before obſerved of two equal heights, one placed nearer the eye of the obſerver than the other, that the nearer height appears higher than the farther; it will of conſequence follow, that if a ſquare plane or parallelogram, as the front of a houſe, be placed before an obſerver, one end nearer the eye than the other, that in conſequence of the nearer vertical angle appearing higher than the farther, the horizontal lines of the top and bottom will appear to decline towards one another, on the ſide of the farther angle; and muſt of courſe, if continued in the repreſentation, meet in a point. Theſe points of union or meeting of inclined lines, have been denominated by the beſt writers on perſpective, the vaniſhing points of thoſe apparently inclined lines.

DEFINITIONS.

14. Vanishing Point, Is a point on the plane of delineation, which is the point of union or point of convergency that two or more lines will have, which are the repreſentations of two or more parallel lines in an original object, placed inclined to the plane of delineation.

This definition and the following (the 15th) and all the obſervations relating to them, ſhould be carefully and thoroughly conſidered; as the juſtly underſtanding of them is matter of the utmoſt importance: 'tis therefore, that the Student is requeſted to be particularly earneſt in the conſideration of them, and if not fully comprehended on a firſt peruſal, to read them over again and again, and ponder on them, till they are thoroughly conceived.

15. Vanishing Line, Is a line on the picture, or plane of delineation, ſuppoſed obtained by a plane paſſing through the eye, *parallel* to any plane in an original object, and produced until it cuts the picture.

Conſequently the *Horizontal line* is the *Vaniſhing line* of all horizontal planes; and all horizontal lines, or lines laying in horizontal planes, will have their *vaniſhing points* in the *horizontal line*.

PLATE 7

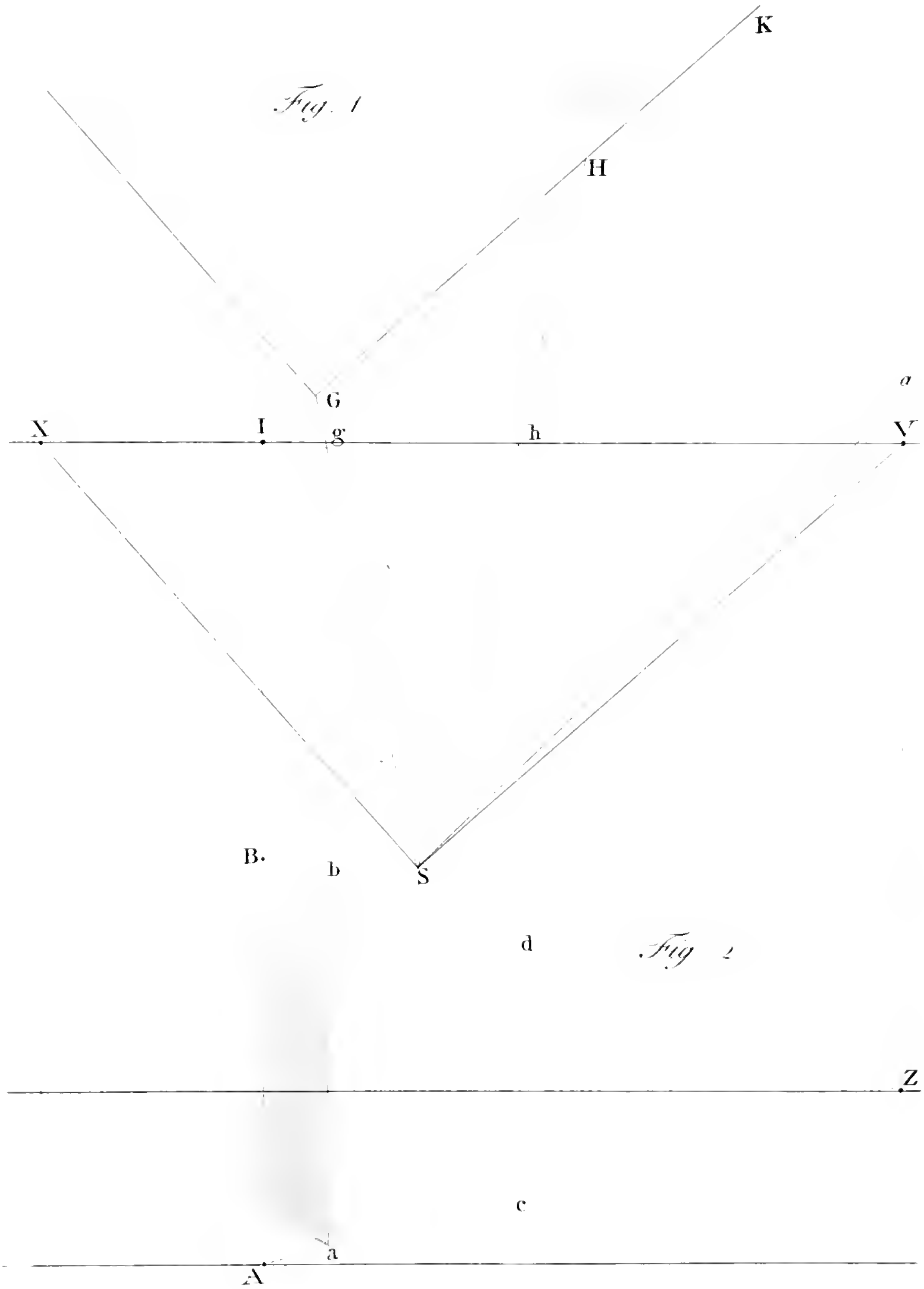


Fig. 1

Fig. 2

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And the *vaniſhing points* of all lines whatever, will be ſomewhere in the lines that are the *vaniſhing lines* of the planes thoſe lines are in.

And farther, all parallel lines in an original object or objects, that are ſituated *parallel* to the plane of delineation, can have no vaniſhing point, but muſt all, as are the originals, be drawn geometrically parallel on the plane of delineation.

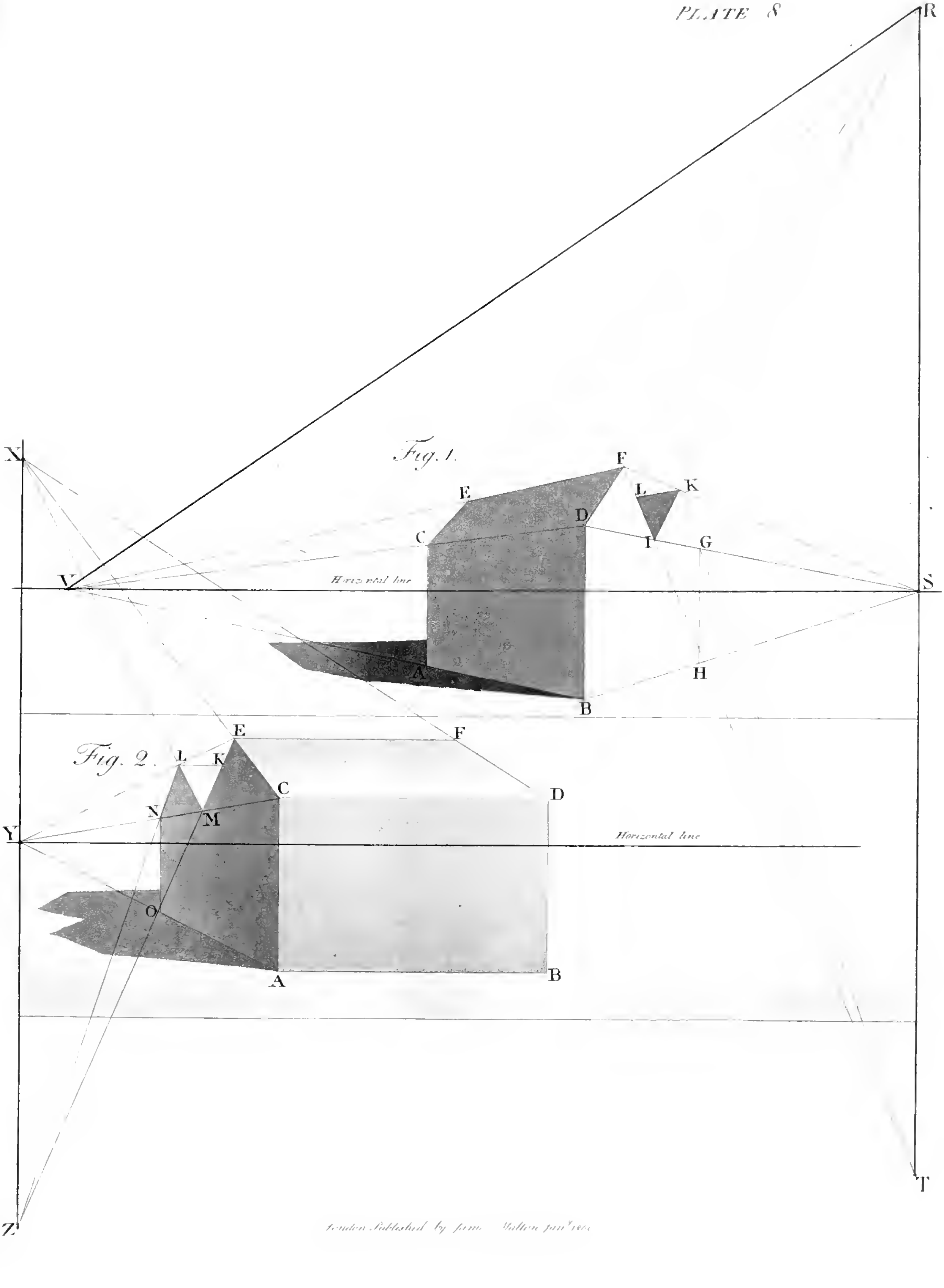
To find the vaniſhing point of a line, inclined to the plane of delineation; draw a line from the eye of the obſerver, parallel to the line of which the vaniſhing point is required, till it cuts the picture or plane of delineation; the point wherein it touches the picture is the vaniſhing point of that original line, and of all lines parallel to it.

Let the line GH (Fig. 1. Plate VII.) be the direction of a front of a building on the ground plane, ſtanding inclined to an obſerver at the ſtation S; and let the line XV be the direction of the plane of delineation; draw SV parallel to GH; alſo draw the viſual rays SG, SH. It muſt be clearly evident that the angle of the front of the houſe, ſtanding perpendicularly over the point G, will appear higher than the equal height at the farther angle, over the point H; of conſequence, the top and bottom horizontal lines of the building will appear inclined, and to have a tendency towards each other on that ſide where the upright angle appears the leſſer, and therefore muſt be ſo repreſented on the plane of delineation. The point wherein they would meet, if produced, would be a point in the horizontal line perpendicularly over the point V in the ground line, at the height of the eye of the obſerver, as is expreſſed by the point Z, in the Diagram below, (Fig. 2.) and which point is obtained by being the interſection of a line drawn from the eye parallel to GH, (Fig. 1.) produced till it touches the plane of delineation XV, in the horizon at V. *Which point would be the point of their tendency, and comprehends infinity of ſpace between it, in the horizon, and the point* I, *the interſecting point of the line* GH *produced till it cuts the ground line*. The angle G will appear to interſect the plane of delineation in the point g; and the angle H will appear to do the ſame in the point h; and the apparent height of each, according to any fixed height of the building, is determined as in the diagram below. Where, the height being ſet up on the interſecting line of the building, AB, and lines being drawn from thoſe points to the vaniſhing point Z, determines the heights a b and c d, as the apparent and comparative heights of the two extreme angles of the building; and the whole plane, were it continued on infinitely, would concentre and vaniſh in a point; as at Z.

For however extended might be the line G H towards K, a visual ray could not be drawn from any point of the extended line G K that could possibly fall in with the line S V, because the line S V is parallel to G K. Wherefore the space from I to V, is the representative space on the plane of delineation, for the infinite extention of the plane over the line G K. How trifling soever might be the variation of the visual ray, as S *a*, from the line S V, were S *a* produced, it would somewhere meet the extended line G K, which could not be the case with the producing of the line S V, because it is parallel to G K; and parallel lines, though produced infinitely, will never meet.

A full illustration of all the foregoing observations and conclusions will be found on survey of the figures, Plate 8, where may be observed (Fig. 1) that the lines A B, C D, E F, and L K, being the representations of parallel lines, the originals of which were in planes inclined to the plane of delineation, have the same vanishing point, V; and being the representations also of horizontal lines, have their *vanishing point* in the *horizontal line*. The lines F K, D G and B H, being also the representations of parallel lines, have likewise a common point of tendency, or vanishing point, S; and, as before, being all horizontal lines, have their vanishing point in the horizontal line, which is the vanishing line of all horizontal planes, consequently all lines laying in horizontal planes have their vanishing points in the horizontal line. Upon the same reasoning the lines C E, D F and I K, being also the representations of parallel lines, have, in consequence, a common vanishing point, as R; and the parallel lines F I and K G, have a like mutual tendency in the point T. But it may be remarked that the horizontal lines F K, D G and B H, and the inclined lines D F, I K and F I and K G are lines all in the same inclined plane B D F I K G H; wherefore, agreeably to the principles before stated, that the vanishing points of all lines laying in the same plane, will be somewhere in the vanishing line of that plane; those three different inclinations of lines will have their vanishing points in the same right line: such may be observed is here the case. The line RST is the vanishing line of the plane B D F I K G H; being the line that would be obtained by a plane through the eye parallel to the original plane, of which that is the representation, and producing it until it would cut the picture, and the three vanishing points of the three different directions of the lines in that plane, are all in that line, as R, S and T.

The line R S T is not the vanishing line of the plane B D F I K G H only, it is the vanishing line also of all planes parallel to that plane; and is there-



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fore the vaniſhing line of the parallel end of the ſame houſe, and all lines laying in that plane will have their vaniſhing points ſomewhere in that line; ſuch is the caſe with the line C E, which has its vaniſhing point at R; for the lines C E and DF, are parallel lines, and though the boundaries of different planes, they are alſo in the ſame plane, DCEF; and will therefore have a common vaniſhing point; which they have, at R.

Fig. 2. is another repreſentation of the above object, but with this difference of poſition, that one plane of the houſe is conſidered as having been placed parallel to the plane of delineation; wherefore the lines A B, C D, E F and L K being all parallel to the plane of delineation, will have no point of declination, or common tendency, but will all be drawn geometrically parallel to each other. But the lines L E, N C and O A being perpendicular to the plane of the picture, becauſe at right-angles with the others, will have their point of tendency directly oppoſite the point of view, or point of ſight; becauſe, on the principle of finding the vaniſhing point of lines, by a line being drawn from the eye, to the picture, parallel to them, it will of courſe be there, as at Y; and a vertical line through Y, will be the vaniſhing line of the plane O N L M E C A. The ſlant lines of the roof F D, E C, and L M, being parallel, though in different planes, will have a point of common tendency in the ſame vaniſhing line, as X; as will alſo the parallel lines L N and E M, at Z.

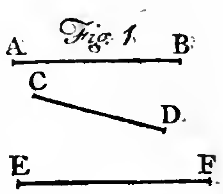
Thus I have brought the inveſtigation of my ſubject to an end; and ſhall here conclude what I may term a whole, but brief theory, of perſpective delineation on planes. I do not however imagine it will be thoroughly comprehended, on a firſt peruſal, by thoſe who were before totally unacquainted with the ſubject; nor do I conſider it will on a ſecond, without ſome practice; but which, I make no doubt, before having gone through the following work of practice, will be clearly and fully underſtood.

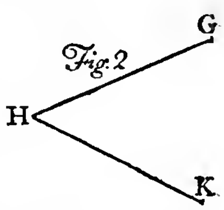
PRACTICAL GEOMETRY.

PREVIOUS to entering on the Practice of Perſpective Delineation, it is requiſite that the ſtudent be acquainted with a ſufficiency of practical geometry, to be enabled to execute, without delay, what may be required in the proceſs of perſpective drawing. In this ſection have been collected ſuch problems on that ſubject as are abſolutely neceſſary; they are of general uſe, and the moſt facile conſtruction of them has been carefully endeavoured. Should practical geometry be already familiar to the reader, this diviſion may be paſſed, only performing the laſt requiſition, as it contains the principal preliminary ſteps relative to the operative lines for finding the perſpective forms of objects from determined ſtations.

To know ſomething of angles, their kinds, how to eſtimate their magnitude, and compare them to each other, is not only requiſite in moſt mathematical reſeaches, but of advantage even in the common purpoſes of life.

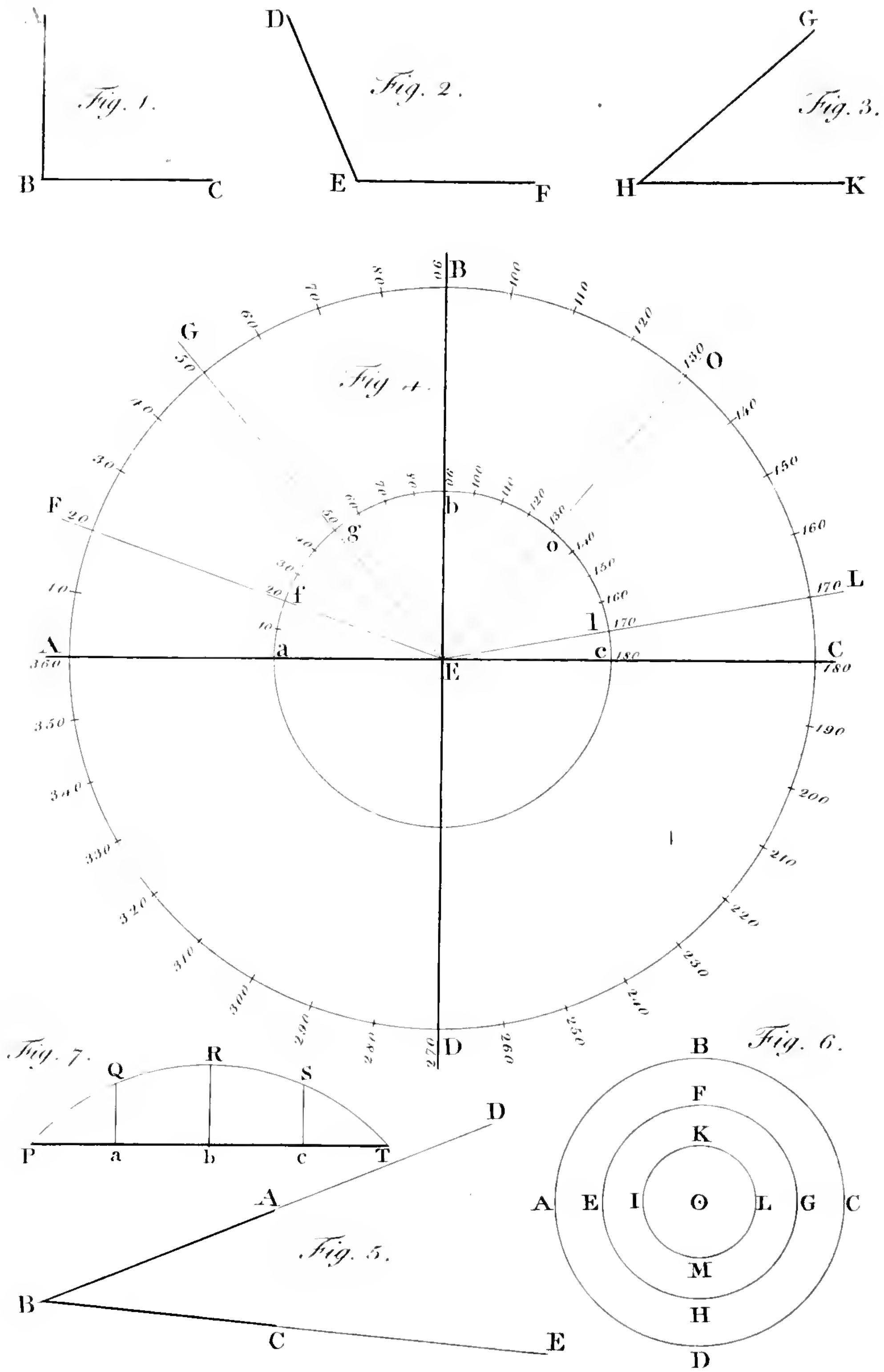
By an ANGLE, in geometry, is meant the inclination, or the mutual tendency, which two lines have to each other that touch at one extreme, and then ſeparate, leaving a ſpace between them.





Mathematicians refer to a line, or to many lines, by letters, or other ſymbols, being placed at their extremes; and identify them, by calling them the lines of ſuch ſymbols or letters; as of the three lines, Fig. 1, which may be denoted the lines AB, CD, and EF. By this ſimple means diſtinct reference is made to different lines where many are confuſedly mixed together; and inferences and conſequences are drawn relative to them, with the utmoſt perſpicuity and exactitude; as of the three lines AB, CD, and EF; aſſerting, that if the line AB is longer than CD, CD is alſo ſhorter than EF, EF being longer than AB. Or, it may be ſaid, that the line AB is parallel to EF, and that CD is inclined to them both. An angle is referred to by three letters, or other ſymbols; one being placed at the vertex, or junction of the two lines forming of it; as H, Fig. 2, and one at each other extreme of the lines, as G and K; to nominate which angle, and convey a ſenſe of the ſame to others, it is read the angle GHK, or KHG, always naming the letter at the vertex of the angle, between thoſe which refer to the other extremes of the lines.

PLATE 9



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Angles, formed by right lines, are of three kinds only; *viz.* Right Angles, Obtuſe Angles, and Acute Angles. When one of the lines forming of an angle is perpendicular to the other, then is ſuch an angle ſaid to be a right angle; ſuch is the angle A B C, Fig. 1, Plate 9, the line A B being perpendicular to the line B C. When the lines have a greater degree of expanſion than a right angle, ſuch an angle is ſaid to be an obtuſe angle, as the angle D E F, Fig. 2; and when they have a leſs degree of expanſion than a right angle, ſuch an angle is ſaid to be acute, as the angle G H I, Fig. 3. [Plate 9.]

The magnitude of an angle is computed by the portion it comprehends of a circle, uſing the angular point as the centre to revolve the circle upon. For the general admeaſurement of angles, the circumference of a circle is divided into 360 equal parts, called degrees; a diviſion univerſally aſſented to; and an angle is ſaid to contain, or to be an angle of as many degrees as fall within the expanſion of the two lines.

If two lines, one perpendicular to the other, croſs each other, there are formed four angles, all right angles. By the croſſing of the perpendicular lines AC and BD, (Fig. 4.) there are formed four right angles, and uſing the point of their common interſection, E, as the point to revolve a circle around upon, each angle will of courſe contain a quarter of that circumference; and the whole circumference being divided into 360 equal parts, each right angle, (all right angles being equal,) muſt contain a quarter of 360, that is 90 degrees. A right angle is a determinate one, and there can be no variety of them; but of obtuſe and acute angles there may be many, of various magnitudes.

The circle ABCD, Fig. 4, is divided into 360 equal parts. The angle AEF, is an acute angle of 20 degrees; the angle AEG an acute angle of 50 degrees; and ſo on to any number ſhort of 90. The angle AEO is an obtuſe angle of 130 degrees, and the angle AEL an obtuſe angle of 170 degrees, and ſo on to any number ſhort of 180, at which period the expanſion of the two lines would fall into one right line, as AEC. For the greater accuracy, in the eſtimating of angles, each degree is ſubdivided into 60 equal parts, called minutes; and each minute into 60 equal parts, called ſeconds; ſo the meaſurement of an angle may be a certain number of degrees, minutes, ſeconds, thirds, &c.

An angle is not enlarged by lengthening of the lines forming of it; for the angle ABC (Fig. 5.) is ſtill the ſame and not at all increaſed by extending of the lines to D and E. An angle is eſtimated only by the degrees of incli-

[Plate 9.] nation which one line forming it has to the other; and that inclination is not increafed by lengthening of the lines; for the line DB has no greater, but the fame inclination to AB that any portion of the line has; and the angle DBE and ABC are one and the fame angle, and would ftill be fo were the lines lengthened out infinitely.

This may be more clearly perceived in Fig. 4, where the angle aEf is the fame with AEF; and aEg with AEG, &c. For, each contains fimilar portions of the curve of their refpective circles; confequently an equal number of degrees. By attentively examining the figure, it will be fully comprehended that the magnitude of angles is affected only by the degree of inclination which the lines have to each other, however fhort they are, or however long.

It is not my intention to give a complete fyftem of Practical Geometry; that would form an extenfive work of itfelf. I purpofe to give only that fufficiency of it as will enable the Student in Perfpective to draw his figures on true principles, and correctly.

A Point may be defined to be the extremity of a line; a LINE, curved, or ftraight, the extremity of a furface; and a SURFACE, plane, or irregular, the boundary of a folid.

A Right Line, is the fhorteft line that can be drawn between two extreme points. A Curved Line, is a line that lays indirect between its extreme points. Lines are faid to be PARALLEL when the perpendicular diftance between them is in every part equal. Curved lines are parallel when they are oppofite portions of concentric curves; and Concentric Circles are fuch as are ftruck upon a common center; as are the circles ABCD, EFGH, IKLM, Fig. 6. being ftruck upon the common center O. In which circles, the portions BC, FG, and KL, are parallel.

An Arc is any portion of a circle, as the arc PQRST, Fig. 7.

A Chord of an arc, is a right line drawn from one extent of an arc to the other, as the line PT of the arc PQRST, Fig. 7.

An Ordinate, or Ordinates, is a line, or any number of lines, dropped from an arc, or curved line, perpendicularly to the chord of that arc, or curved line, as the lines Qa, Rb, Sc, Fig. 7. which are dropped from the curve PQRST perpendicularly to the chord PT.

An Angle has already been defined; page 18.

PROBLEM I. To make an angle equal to a given angle, from a given point, in a given line. [Plate 10.]

ABC, [Prob. 1. PLATE 10.] *is the given angle, and* E *the given point in the line* EF[a].

With one leg of the compaffes fixed on the vertex B, of the given angle, with the other defcribe the arc AC; with the fame extent of compaffes, and with one leg fixed in the given point E, defcribe the arc, FD, indefinite; then extend the compaffes from A to C, and apply that meafure from F to D, making the arc F D equal the arc A C; draw the line E D, then will the angle DEF, be equal to the angle ABC.

Note. For greater accuracy in meafuring, or making equal angles, let the expanfion of the compaffes be as great as the angle to be meafured, or the compaffes will well allow.

PROB. II. To draw a line from a given point, parallel to a given line.
GH *is the given line, and* I *is the given point.*

From the given point I, draw a line as I H at pleafure, touching the given line, in a point at H; make the a gle H I K, equal the angle G H I, by Problem I, and the line IK will be parallel to t e line GH.

PROB. III. To bifect, or to divide, a given line into two equal parts.
LM *is the given line.*

With an extent of compaffes greater than half the given line, on each of its extremes L, and M, defcribe two arcs croffing each other in the points a and b; draw the line a b which will bifect, or divide the line LM into two equal parts.

PROB. IV. To bifect, or divide, any given angle into two equal divifions.
NOP *is the given angle to be divided.*

On the vertex O of the given angle, defcribe an arc, as NP; with the fame or any extent of compaffes greater than half that arc, on the points N, and P, defcribe two arcs interfecting each other at c; then draw the line O c, which will bifect the angle NOP.

DEFINITION. *A right line is faid to be perpendicular to another right line when it does not incline to either fide, but makes a right angle on both fides of the line. And this, be the two lines pofited as they will, without regard to what is really horizontal or vertical.*

[a] Throughout thefe Problems, the given requifites, fuch as lines, angles, &c. are drawn with ftout lines; the operative lines, or lines of the procefs, are all dotted; and the required lines, or the lines obtained, are expreffed by fine lines.

[Plate 10.] Prob. V. To draw a right line perpendicular to a given right line, from a given point in that line.

RS *is the given line, and* T *is the given point.*

On each ſide of the given point T, ſet off equal meaſures, as TR, and TS; then, with any greater meaſure in the compaſſes, on the points R, and S, deſcribe two arcs interſecting each other in the point d; draw the line dT, which will be perpendicular to the line RS.

Prob. VI. At the extreme point of a given right line, to draw another right line perpendicular to the given line.

VX *is the given line, and* X *the given point.*

Aſſume any point, as the point e, at pleaſure, but let it be ſomewhere about midway between the line given and the line required, and fixing one leg of the compaſſes in that point, extend the other to the point X, from whence the perpendicular is required, and draw the curve VXZ indefinite; then applying a ruler to the points e, and V, where the curve touches the line V X, draw the right line VeZ, touching the other extreme of the curve in the point Z, and draw the line XZ which will be perpendicular to the line VX.

The foregoing propoſition is a very uſeful one, and worthy of particular conſideration. If from each extreme of the diameter of a circle, lines be drawn meeting in the circumference, the angle that would be formed, would be a right angle; and of conſequence the lines one perpendicular to the other. Thus in the ſemicircle ABCDE, Fig. 7, if two lines AB and BE, be drawn, meeting in the point B, the angle made, the angle ABE, will be a right angle: alſo the angle A C E is a right angle, ſo is the angle ADE; and ſo would any angle be which extended the diameter, and whoſe vertex touched the circumference.

In Problem VI. before performed, the curve VXZ is a ſemicircle, of which VZ is the diameter; and the angle VXZ is an angle extending the diameter, and whoſe vertex touches the circumference, conſequently the angle VXZ is a right angle.

Prob. VII. To draw a line perpendicular to a right line, from a given point out of that line.

FG *is the given line, and* H *is the given point.*

On H, the given point, with any opening of the compaſſes greater than the diſtance of the line, draw an arc, as FG, cutting the given line in the two points

F and G. Then with the ſame, or any opening of the compaſſes greater than half the ſpace between the two points F and G, deſcribe two arcs on the other ſide of the line, interſecting at f, and draw fH, which will be perpendicular to FG. [Plate 10.

PROB. VIII. To divide a line proportionally, as another is divided.

IK *is the line required to be divided in the ſame parts, proportionally, as is the line* LM *in the points* g *and* h.

Place the two lines parallel to each other, and at any diſtance at diſcretion, as *IK*; draw the lines L*I* and M*K*, touching the extremes of the given lines, and produce them till they meet in the point N ; then draw the lines hN and gN, cutting the line *IK* in the points i and k, the points required. The diviſions made on the line *IK* will be proportionally to each other, and to the whole line, as are the diviſions in the line LM, to one another, and to the whole line.

DEF. A SQUARE *is a Quadrilateral whoſe oppoſite ſides are equal and parallel, and its four internal angles all right ones.*

PROB. IX. To conſtruct a Square on a given line. OP *is the given line.*

On either extreme of the given line, O or P, ſuppoſe O, draw a perpendicular line, as OR, (Prob. VI) make the line OR equal to the line OP, and with the ſame meaſure in the compaſſes, on the points P and R, draw two arcs interſecting each other at S; then draw the lines SR and SP, which will complete the Square ORSP.

DEF. A REGULAR HEXAGON, *is a ſix equal ſided right lined figure, having ſix internal angles, which ſhould alſo all be equal.*

PROB. X. To conſtruct a regular hexagon on a given line, for a ſide.

TV *is the given line, for a ſide of the hexagon.*

On the two extremes of the given line T and V, with the length of the line TV in the compaſſes, deſcribe two arcs, as TmW, and VmZ, interſecting each other at m ; on which point m, with the ſame meaſure in the compaſſes, deſcribe the circle TZXYWV, and ſtill with the ſame meaſure, on the points Z and W, mark the circle in the two other points X and Y, and draw the lines TZ, ZX, XY, YW and WV, which will complete the hexagon TZXYWV.

Note, a ſide of a regular hexagon, is the chord of the ſixth part of the circumference of a circle circumſcribing of it.

DEF. A REGULAR OCTAGON, *is an eight equal-ſided, right lined figure, having eight internal angles, which ſhould alſo all be equal.*

[Plate 10.] PROB. XI. To conftruct a regular octagon, on a given line, the dimenfion of one of its fides.

AB *is the given line for the fide of an octagon.*

Produce, or lengthen, the line AB, both ways, towards I and K, and on the points A and B, draw the perpendiculars AE and BF indefinite (Prob. V.) Bifect the right angles EAI and FBK (Prob. IV.) by the lines AC and BH, which lines make each equal to the given fide of the octagon AB. Draw CD and HG parallel to AE and BF, and make them alfo each equal to AB; laftly, make the lines AE and BF, each equal to CH, and draw the lines DE and FG, which will complete the octagon A C D E F G H B.

As an octagon is a figure of very frequent occurrence in buildings, often forming the ground plan of apartments, and, as commonly as the circle, fhaping the bows or projecting ends and fides of rooms; I have defire therefore, to give as correct and expeditious ways of conftructing it, as poffible, and probably the following may be found more fo, than the one juft defcribed, when fuch method can be followed.

Note.—It often happens that an octagon is required to be conftructed in a given fpace, that is, its diameter or breadth is given, and not a fide. When that is the cafe, the bufinefs is foon accomplifhed, by firft making a fquare of the diameter, and proceeding as follows.

PROB. XII. To conftruct an octagon on a given line, its diameter or breadth.

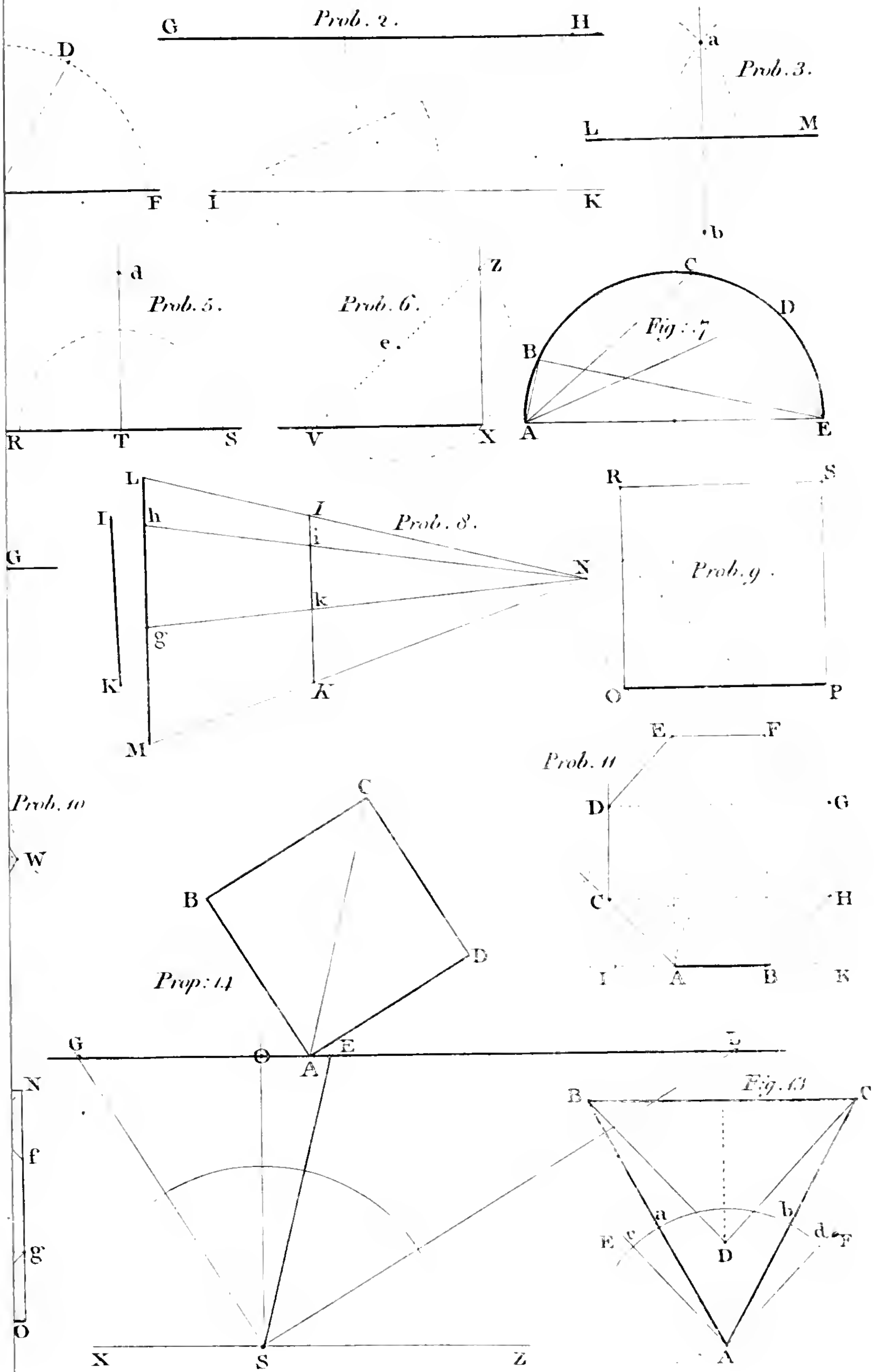
LO is the given line for the diameter of an octagon.

On the given line LO firft conftruct a fquare (Prob. IX.) as LMNO, and draw the diagonals LN and MO, interfecting each other in the point k; then on the four angles of the fquare, with the meafure of one half of a diagonal in the compaffes, defcribe the four arcs c k h, b k e, d k g, and f k a, cutting the fides of the fquare in the points a b c d e f g and h; laftly, draw the lines ab, cd, ef, and g h, which will form and be fides of the octagon required, a b c d e f g h.

If from any point within a triangle, two right lines are drawn to the extremes of any fide of that triangle, thofe lines form a larger angle than the remaining two fides of the triangle.

In the triangle ABC, (Fig. 13) let a point, as D, be affumed, and draw the lines DB and DC; then will the angle BDC, be greater than the angle BAC. By drawing the lines AE and AF, refpectively parallel to the lines DB, and DC, the circumftance will be manifeft, for the angle E A F is equal the angle B D C, the lines being parallel; but the angle AEF is greater than the angle BAC, which expands but the portion from a to b of a circle meafuring of it, while the other extends from c to d; wherefore the angle B D C, equal the angle E A F, is greater than the angle B A C; agreeably to the premifes ftated.

PRACTICAL GEOMETRY



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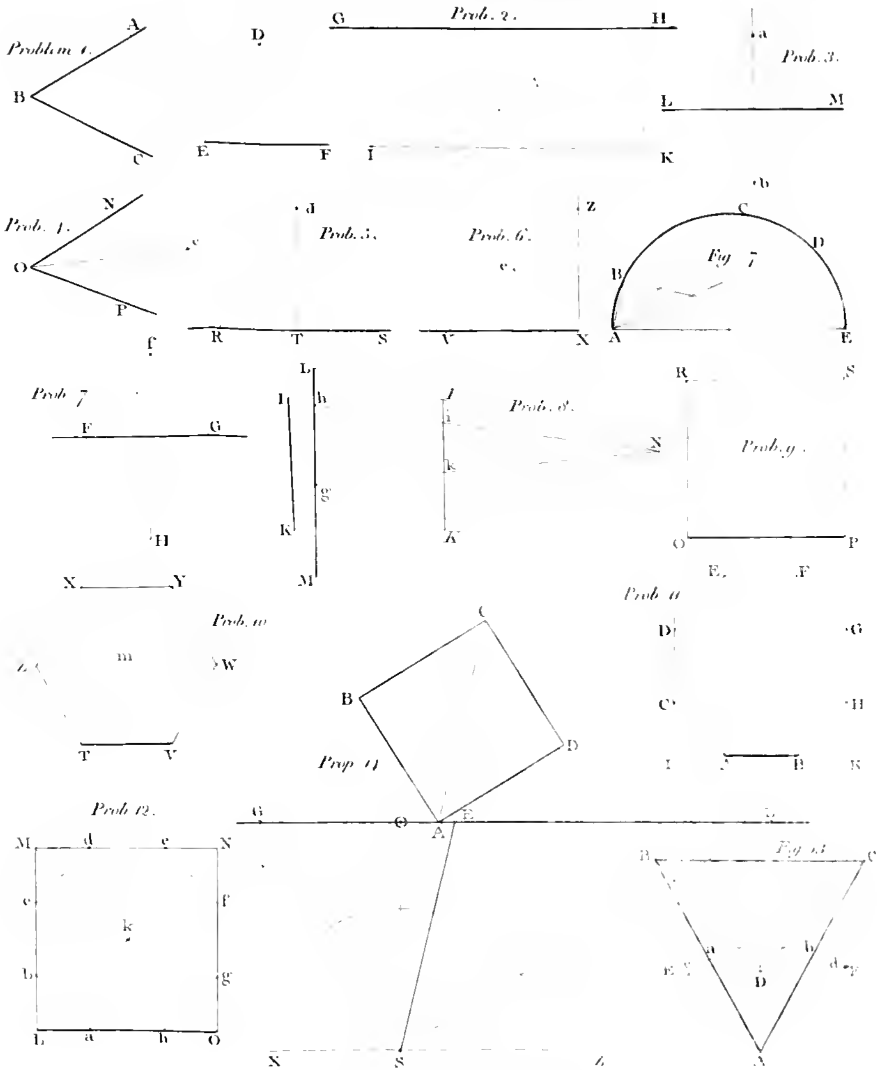
PRACTICAL GEOMETRY



These are all the geometrical problems I think neceſſary to the proſecuting of [Plate 10.] practical perſpective delineations; ſhould the ſtudent wiſh for farther, or more complete information, on this ſubject, I muſt refer him to the Work publiſhed by my Father, entitled, "A ROYAL ROAD TO GEOMETRY;" where will be found a complete body of Geometry, both elementary and practical, fully and clearly inveſtigated; and alſo a comprehenſive and brief theory of menſuration of ſuperficies and ſolids, with ſome of the moſt commonly uſeful properties of the ellipſis or oval, pleaſingly illuſtrated.

PROPOSITION 14. Draw the following perſpective ſcheme.

As a confirmation of acquaintance with practical Geometry, and of the uſe of the compaſſes, it is required to draw the following ſcheme, which muſt be done with facility, as it is the previous ſtep to drawing any regular perſpective delineation, according to the practice of the following work.

On a given line, as A B, conſtruct a ſquare, as A B C D, (Prob. 9) draw a line G L, at pleaſure, touching the angle A of the ſquare. Through a point, as S, aſſumed on this ſide the line G L, draw a line, as X Z, parallel to the line G L. (Prob. 2). From the point S, draw a line as S O, perpendicular to the line G L. (Prob. 7). Alſo from the point S, draw the lines S G, and SL, ſeverally parallel to the ſides of the ſquare, A B, and A D, by making the angles G S X and L S Z reſpectively equal to the angles B A G and D A L. (Prob. 1.) And laſtly, draw the line S E biſecting the angle G S L. (Prob. 4). Which line will be parallel to the diagonal of the ſquare, AC.

In the courſe of drawing perſpective delineations of houſes, &c. continual mention and reference muſt be made to plans and their component parts, with which the ſtudent will be conſidered to be well acquainted; but leſt that ſhould not be the caſe, it is neceſſary he be inſtructed as to what is meant and expreſſed in a plan of a building, and informed how the ſame is read by architects and others, acquainted with their indications.

A plan of a houſe is commonly explained or defined, as being the figure, marked out on the ground of the external boundaries, and internal diviſions of the apartments of a building, either in actual exiſtence, or intended to be built. In one reſpect ſuch is a juſt definition, but in general, much more is expreſſed in plans than merely the ſituation, ſize, and figure, of the apartments; both to ſhew the proprietor what he is to expect, and that the builder may fully

comprehend what he is about to erect. A plan, as moft generally drawn, is properly an horizontal fection of a building at a ftated height; or it is the figure, which the top of the walls would exhibit, when raifed all to the fame level a few feet above the ground, if looked at from above directly down upon them; whereby many incidents in the ftructure are expreffed, that cannot be marked out in the trenches, or even take place, fome four, five, or fix, feet above ground.

[Plate 11.] This will be better underftood by reference to fenfible figures. To thofe who are converfant in Architecture, the Elevation (Fig. 1, Plate 11,) would be nearly pictured in the imagination from the mere infpection of the plan; Fig. 2; but the plan, Fig. 2, is not the figure that would be cut out in the ground, as fhaping the foundation to the building; fuch would be fimply as Fig. 3, expreffing little more than the length and breadth of the apartments, and thicknefs of the walls, more information could not be gathered from it. Whereas, from the plan, Fig. 2, is underftood that in front there are two pillars ftanding in a recefs, with a door between them, and a niche in the middle of the pier on each fide; alfo, that in each end of the apartment, within, there is a window, that there is a chimney in the middle of the crofs-wall, with a door on the right leading into another apartment, and a recefs for a falfe door on the other fide the chimney, to be uniform with the real door; that the lines 1, 2, 3, 4, 5, &c. exprefs an afcending flight of ftairs; that A is the half-landing, on which there is a window to light the ftaircafe, and that the dotted lines imply the returning flight to the next ftory: all which is clearly gathered and immediately underftood from infpection of the plan fimply, with other minute particulars; fuch as the number of fteps that conduct into the dwelling, implied by the lines marked a, b, c, that they fall within the pillars, that there is intended a plinth around the building expreffed by the double line around, that there is meant a bafe to the pillars, and fuch like minutia; and to the whole there is affixed a fcale of feet, proportionally to the plan laid down, by means of which the dimenfions, that is, the lengths and breadths of apartments, may be known, and the breadths of doors, windows, fire-places, ftairs, and treads of ftairs, &c. may be accurately meafured.

Such delineation is undoubtedly an horizontal fection of the walls, taken fome fix or feven feet from the ground; fomewhere about the height of the line BC, Fig. 1. Indeed there are particulars expreffed that cannot be noticed till the building is raifed confiderably higher, as the window D, on the

Fig. 1.

Fig 2.

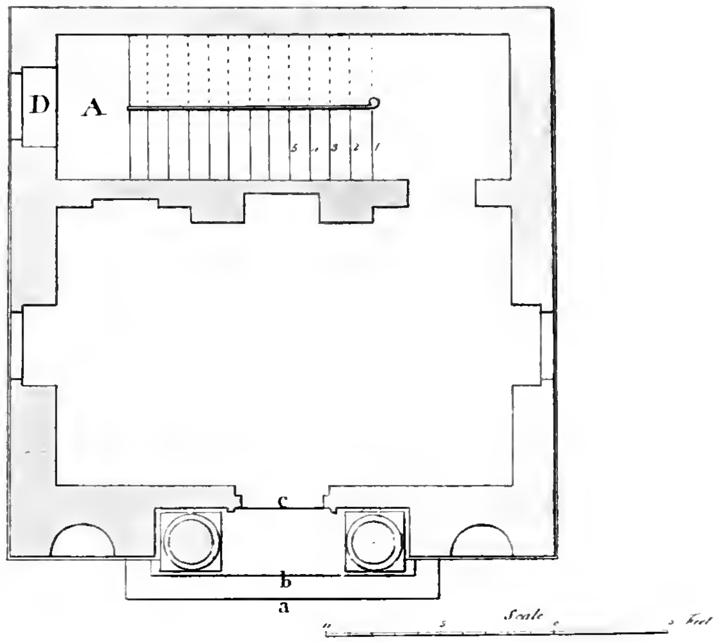


Fig. 3.

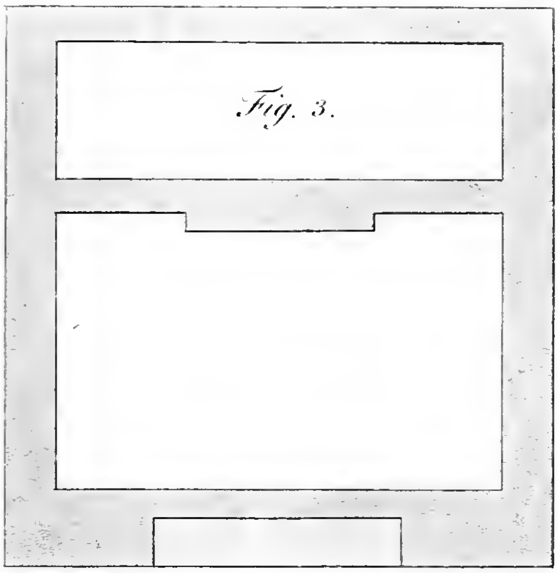


Fig 4.

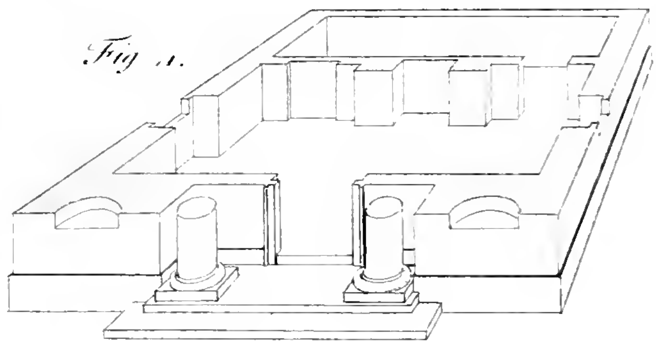


Fig. 5.

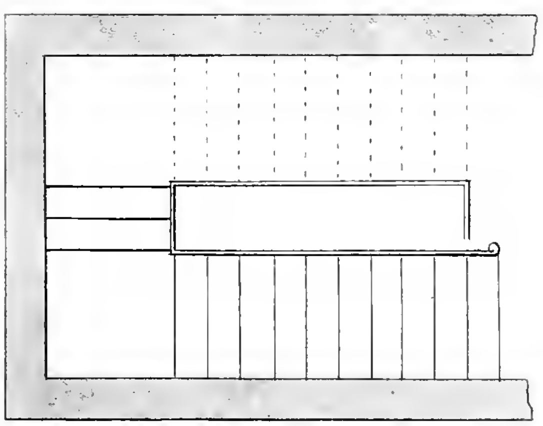
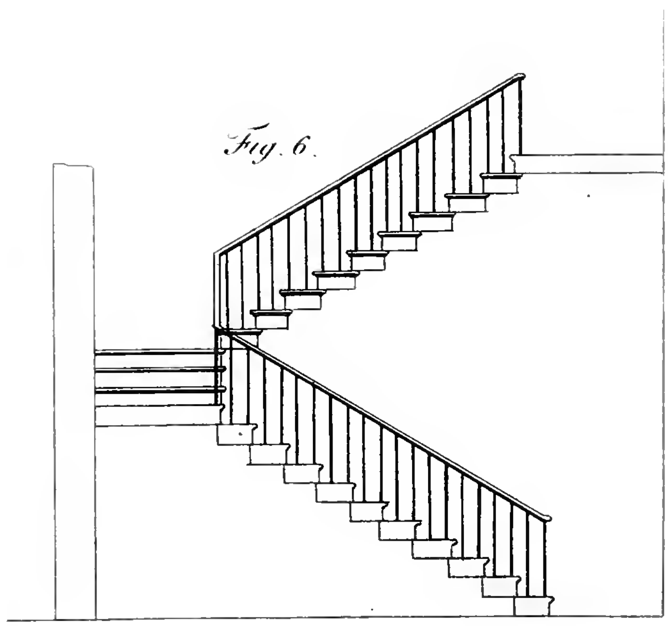


Fig. 6.



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half landing, and the completion of the ſtair-caſe to the ſecond ſtory. [Plate 11.] All of which may ſtill be better conceived from inſpection of the perſpective delineation, Fig. 4, repreſenting the ſtructure as raiſed ſome ſeven feet above the ground level, and of which the plan, Fig. 2, is the geometrical or ichnographical projection.

I have been thus particular to avoid all delay from the want of ſuch neceſſary information; and for the more certain aſſurance of having no impediment to check advances, I will deſcribe how a ſtair-caſe is read from its geometrical plan. Fig. 5, is the plan of a ſtair-caſe, ſhewing the ſpace of ground it occupies, and the number and breadth of the ſteps. Fig 6, is the geometrical elevation of that ſtaircaſe, ſhewing its relation to the plan, and the height and direction of the flight of ſteps to the ſtory above, to which they conduct: the height of the ſteps is regulated to the height they are intended to mount to, and the breadth, to the convenience of the tread and the ſpace allowed to contain the whole in.

PRACTICAL PERSPECTIVE.

IF the ſtudent has attentively peruſed the Introduction to this work, and fully comprehends it, he will be ably qualified to proceed to the practice of what is there inveſtigated; at the ſame time he will enjoy the ſatisfaction ariſing from knowing perfectly what he is about to do, and of being convinced of the truth of the reſult. Should he have neglected, or from previous knowledge have no occaſion for, that examination, he will here, merely have to perform as directed, placing implicit confidence in his inſtructor that he will not lead him aſtray.

The ſtudent is particularly requeſted, that he reſt not ſatisfied with only following me through my own diagrams and deſcriptions; it is requiſite that he draw them out himſelf, to a much larger ſcale; nor be content with performing each caſe once only, but to practiſe them twice, or thrice, varying their poſitions, and attentively following the general rules given for their proper delineation; by which procedure his knowledge will not only be ſtrengthened, but the practice will become eaſy and familiar. He ſhould alſo obſerve to proceed ſtep by ſtep, as directed, nor draw one line but as told; then will all confuſion vaniſh, miſunderſtanding be avoided, and the whole be clear and ſatisfactory.

Diſguſt is but too often conceived at the multiplicity of lines exhibited in works on perſpective delineations, reflection not being made, that every line of the whole example, and every needful proceſs requiſite for the completion of that example, are there obligated to remain, that the ſame may be ſeen and done by the ſtudent; but in his performance much the greater part need only be drawn in pencil, and obliterated when the end required is obtained; and this of every proceſs from firſt to laſt; thereby avoiding all neceſſity of confuſion of operative lines, they being removed like as the ſcaffolding is taken from about a building as it is completed.

As my entrance on this ſubject is different from any that has hitherto been made public, I deem it ſomewhat incumbent on me to give my reaſon for deviating from the beaten track; and it is briefly, that I think, before a ſtudent is capable of executing the minutiæ of this art, he ſhould firſt comprehend and practiſe it upon a general and broad baſis. I am therefore induced, in the firſt place, to give a number of examples for the delineation of the various ſimple forms of buildings, from the proper requiſites given or known. In the ſecond I ſhall exemplify the different parts of buildings, as doors, windows, ſteps, pedeſtals,

bafes, and capitals of columns, cornices, vafes, &c. And in the third, I fhall combine the two former parts together, in the reprefentation of regular, and fome difficult, pieces of Architecture; and conclude with the leading principles for cafting of fhadows from a given place of the light. I purpofe alfo, in an Addendum, to touch upon the fubject of reflections on water, and plane mirrors, fhowing their pofitive and only true attainment by the rules of perfpective; and a critical inquiry into fome circumftances of difpute relative to diftorted reprefentations of objects, arifing from injudicious proceeding, but from no error or fallacy in the rules of perfpective delineation.

Before the practice is begun, I think it expedient once more to draw the attention to the principal definitions of terms ufed in the procefs of perfpective delineations; and that they may be the more certainly underftood, and more deeply impreffed on the mind, I fhall make reference from them to a fcheme, which will, I am of opinion, with a little reflection, clearly fhow their relation and unity, beyond almoft a poffibility of mifunderftanding.

DEFINITIONS*.

[Plate 12.]

1. ORIGINAL OBJECT, or OBJECTS. Is any object, or number of objects, propofed to be delineated; as a houfe, a fhip, a man, or all, or many of them, together.

In Figure 1, Plate 12, the houfe ABCDFHK, is the *original object.*

2. ORIGINAL LINES. Are any lines that are the boundaries of original objects, or of planes in thofe objects.

The lines AB, BC, CD, &c. are *original lines*, being the boundaries of the *original object* ABCDFHK.

3. GROUND PLANE. Is the plane upon which the objects to be drawn are placed; and is always confidered a boundlefs level plane.

The plane X, is the *ground plane*, whereon ftands the object ABCDFHK.

4. POINT of VIEW, or POINT of SIGHT. Is the fixed place of the eye of the obferver, viewing the object or objects to be delineated.

E, The eye of the obferver, is the *point of view, or point of fight.*

5. STATION POINT. Is a point on the *ground plane*, perpendicularly under the *point of fight*, or eye of the obferver, and expreffes the ftation whence the view is taken.

S, is the *ftation point*, being a point on the *ground plane* perpendicularly under the eye of the obferver, at E.

* Thefe definitions refer alfo to my Apparatus.

[Plate 12.] 6. PLANE of DELINEATION, or The PICTURE. Is the canvafs or paper, upon which it is intended to draw any object or number of objects.

The plane G I K L, is the *plane of delineation;* but in the extenfive fenfe of the word, the *plane of delineation* is confidered a boundlefs plane, however circumfcribed may be the draft thereon made.

7. HORIZONTAL LINE, or the HORIZON. In perfpective delineations, is a line on the *plane of delineation*, in every part level with the eye of the *obferver*, or *point of view.*

V Z, Figure 1, is the *horizontal line*, on the *plane of delineation* G I K L.

The horizontal line is fuppofed obtained by the interfection of a plane paffing through the eye of the obferver, parallel to the *ground plane*, produced till it touches *the plane of delineation.*

The mere infpection of the diagram, Figure 2, cannot fail of giving thorough infight as to what is meant by the horizontal line, and how it is fuppofed obtained. F G H I is the *plane of delineation*, A B C D the *horizontal plane* paffing through the eye of the obferver touching the *plane of delineation* in the line B C, which is the *horizon*, or *horizontal line.*

8. CENTRE OF THE PICTURE. Is the point on the picture, perpendicularly oppofite the eye of the obferver or point of view; and is confequently always fomewhere in the *horizontal line.*

⊙, in the *horizontal line*, Figure 1, is the *Centre of the Picture*, being perpendicularly oppofite the eye, at E.

9. VERTICAL LINE. Is a line drawn through the *Centre of the Picture* perpendicular to the *horizon.*

P R, Figure 1, is the *vertical line*, being drawn perpendicularly through the *Centre of the Picture*, ⊙.

Note, the vertical line determines how much of the view lies to the right, and how much to the left, of the eye of the obferver.

10. DISTANCE OF THE PICTURE. Is the direct line between the eye of *the obferver*, and the *centre of the picture.*

E ⊙, Figure 1, is the *diftance of the picture*, or *plane of delineation* G I K L.

11. GROUND LINE. Is the line made by the *plane of delineation*, touching the *ground plane.*

G L, Figure 1, is the *ground line* of the *plane of delineation* G I K L.

12. INTERSECTING POINT. Is a point made on the *plane of delineation*, by the producing of any line in an *original object*, till it touches the *plane of delineation.*

The point T, Figure 1, is the *interſecting point* of the *original line* B A. [Plate 12.]

13. Intersecting Line. Is a line made on *the plane of delineation*, by the producing of any plane in an *original object*, till it touches the *plane of delineation*, or where, if produced, it would touch it.

The line WT, Figure 1, is *the interſecting line* of the *original plane* ABCDN; being the line, where that plane, if produced, would touch *the plane of delineation*.

14. Vanishing Point. Is that point, on the plane of delineation, to which two or more lines will converge, which are the perſpective repreſentations of two or more parallel lines in an original object, placed inclined to the plane of delineation.

The point V, Figure 1, is the *vaniſhing point* of the line A B, being effected by the line E V being drawn from the eye of *the obſerver* parallel to it, and produced till it touches the *plane of delineation*, in the point V.

For the ſame reaſon, V is the vaniſhing point of the line C N; it is alſo the vaniſhing point for any other line that is parallel to the line C N, as BA; all parallel lines having the ſame *vaniſhing point*. The point Z, Figure 1, is the *vaniſhing point* of the line A K, being obtained by a line drawn from the eye parallel to the line A K, and produced till it touches the *plane of delineation*. The point Z is alſo the vaniſhing point of the original lines D F, and N H.

Note, There will be as many different vaniſhing points of lines in the delineation of an original object as there are different directions of lines in that original object.

The point I, Figure 1, is the vaniſhing point of the parallel original lines D N and F H; being effected by the line E I being drawn from the eye parallel to them till it touches the plane of delineation. And for the ſame reaſon Q is the vaniſhing point of the line C D.

In the proceſs of perſpective delineations, the plan of the object being drawn out, the place of the various vaniſhing points of horizontal lines is found on the ground line, whence they are transferred to the horizon by perpendicular lines over them; as may be ſeen, Figure 3. Where ſuppoſe S the ſtation of an obſerver, and E the point of view; the lines S A and S B may be the direction of lines finding the vaniſhing points of any original lines, and being transferred perpendicularly to the points C and D in the horizon, anſwer the ſame as if they had immediately been obtained from the eye by means of the lines E C and E D. The effects of the ſame proceſs may be obſerved in Figure 2, where the points F and I are transferred to the horizon perpendicularly, in the points B and C; the ſame as if they were effected on the horizontal plane by the lines E B and E C.

15. Vanishing Line. Is a line on *the picture*, ſuppoſed made by a plane paſſing through the eye of *the obſerver* parallel to any *original plane*, and produced till it touches *the picture*.

The line V Z, Figure 1, is the *vaniſhing line* of an horizontal plane, and of all horizontal planes; being effected, by being the interſection of a plane paſſing

[Plate 12.] horizontally through the eye, or parallel to an horizontal plane. The vertical line I V G, is the *vanifhing line* of the original vertical plane A B C D N, being the line where a plane paffing the eye of *the obferver* parallel to that plane, would touch the *plane of delineation*.

There will be as many different *vanifhing lines* on the *plane of delineation* as there are different pofitions of planes in the object or objects; and all parallel planes will have the fame *vanifhing line*. Alfo all lines lying in the fame plane will have their *vanifhing points* in the *vanifhing line* of that plane.

All planes or lines in an *original object*, which are fituated parallel to the *plane of delineation*, can have no *vanifhing lines* or *vanifhing points* on the *plane of delineation*.

16. VISUAL RAY. Is an imaginary right line, implying a ray of vifion directed from the eye, to any point, the object of its regard or contemplation.

E A, or E I, &c. Fig. 1, are *vifual rays*, being right lines from the eye to the points A and I.

A number of vifual rays directed to every part of an object, muft form a pyramid of rays, of which the eye is the apex, and the object the bafe.

17. A PERSPECTIVE DELINEATION. Is fuch a delineation as may be fuppofed to be made by a plane making a fection of a body or pyramid of rays proceeding from an eye, while contemplating an object, or many objects. Such a figure, or fuch figures, obtained by the rules of perfpective, is called a perfpective delineation.

The fection of a pyramid of rays, producing a perfpective projection, is moft commonly confidered as being taken between the object and the eye; but the fection of rays may be taken when they are extended beyond the object, in which cafe fuch a fection is called a projected perfpective reprefentation of the object. The latter cafe gives fuch a figure of the contour of the object, as would be made by the fhadow of it from a torch being put in the place of the eye of the obferver; as may be diftinctly feen, Figure 4. Where G may be confidered the place of the eye, or torch; H I the object; a b c d, the intervening plane; and K L M N the exterior plane beyond the object. The fection of the rays h i, on the plane a b c d, is called the perfpective or fcenographic projection; and the fection m n, on the plane K L M N, the projected perfpective reprefentation, or fhadow by torch light.

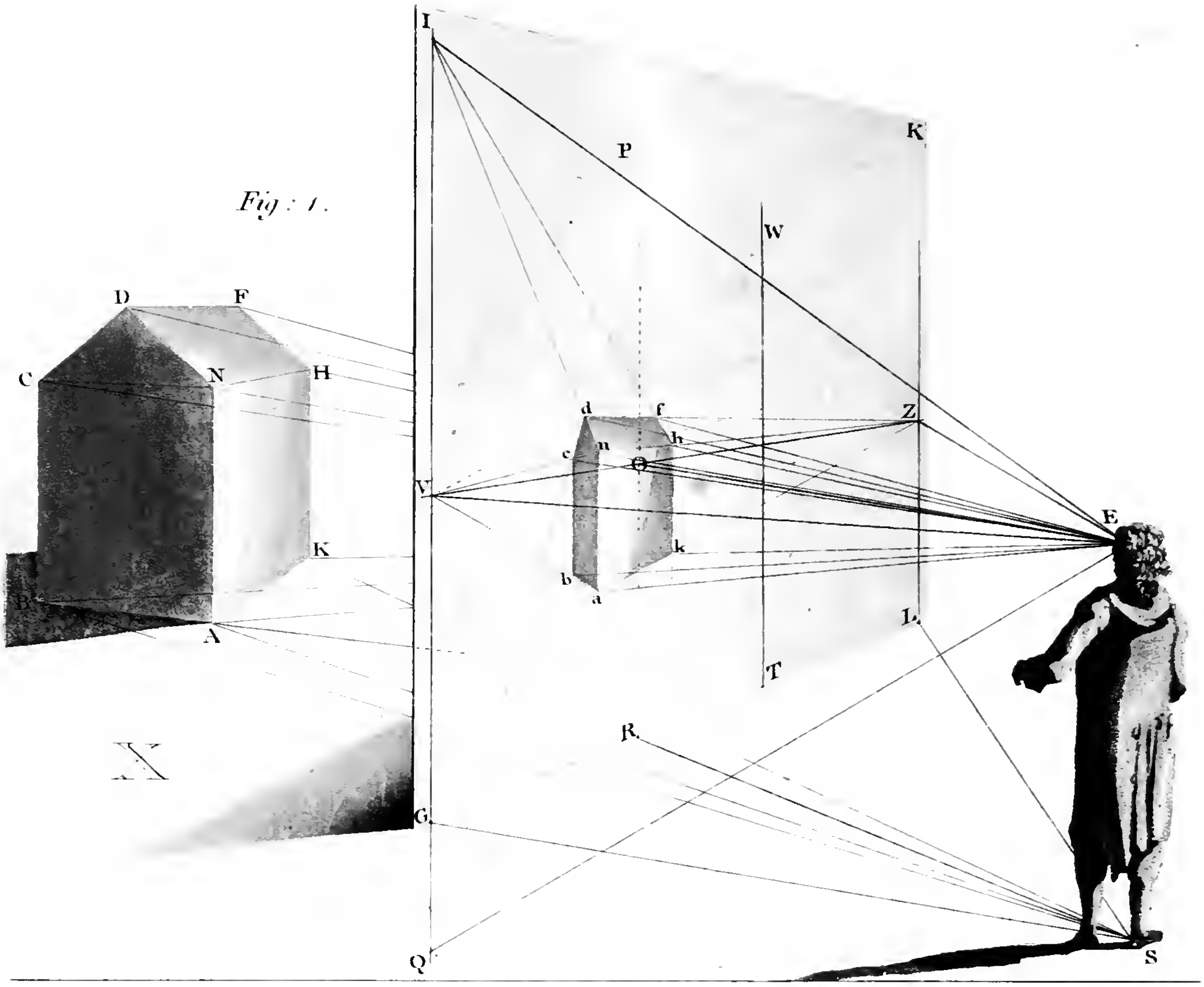
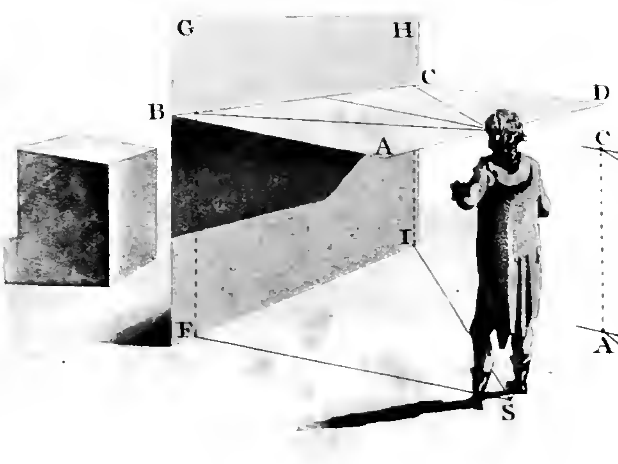


Fig: 1.

Fig: 2.



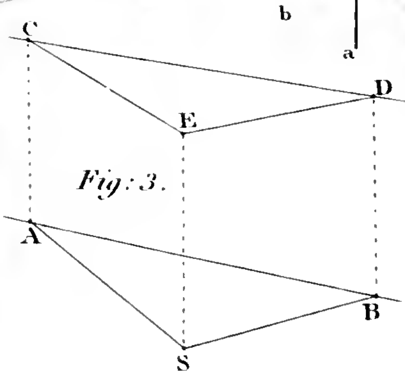


Fig: 3.

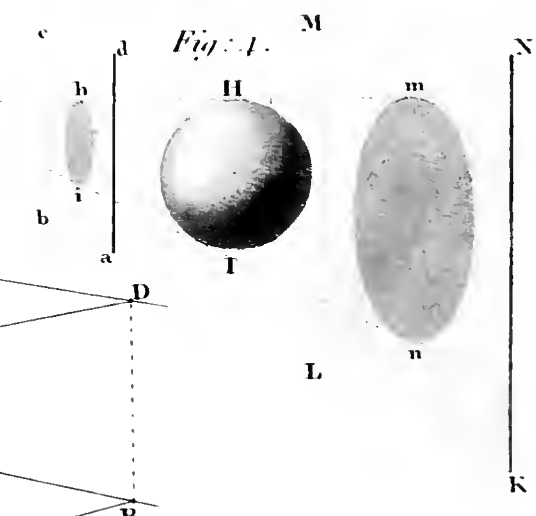


Fig: 4.

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To know perſpective, is to know the rules ſo to delineate objects, as to expreſs their apparent leſſening, as they are more and more remote. The apparent leſſening of objects, and their change of form, is the ſilent language of nature indicative of diſtance and variety of poſition. Perſpective, according to the elegant and correct definition of Addiſon, is, " the ſcience by which things are ranged in picture, according to their appearance in their real ſituation."

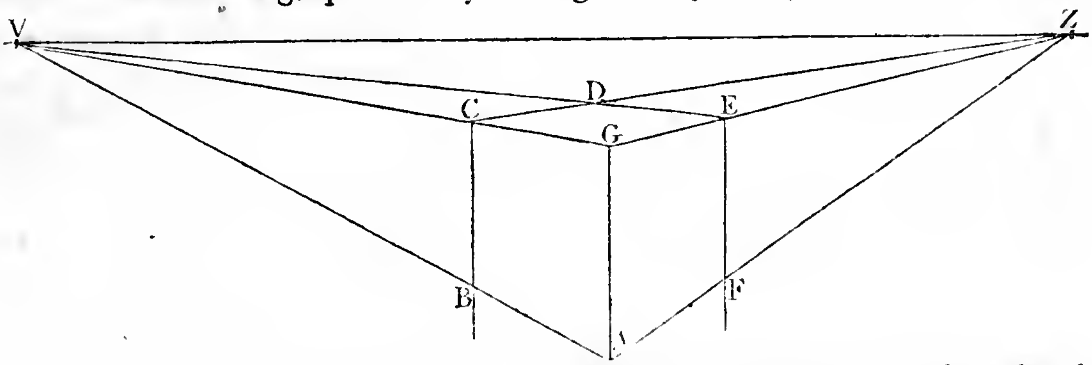
The ſituation of the objects being given, with the place and poſition of the plane of delineation, and height and diſtance of the eye of the obſerver; the delineation of the objects is truly determinable by rule, and may moſt mechanically be performed, as follows:

EXAMPLE I.

[Plate 13.]

Let it be required to find the apparent form that a cube would exhibit, if when placed over the ſquare ABCD (*Fig.* 1, *Plate* 13), *its baſe, it was viewed by an eye elevated two inches perpendicularly over the ſtation* S, *and ſuppoſing the plane of delineation to ſtand vertically over the line* GL.

Firſt, I would adviſe the Student to place a cube before him in the poſition ſtated, and recommend that a ſketch of its appearance be made by the eye alone, as correctly as he can, which will for certain be a form agreeable to the figure below. In ſketching, particularly of regular objects, judgment ſhould ever



direct the hand; as here, the eye being elevated ſomewhat above the cube, the top of it will, of conſequence, be ſeen, and, in the poſition ſtated, will appear nearly of the form of the delineation G C D E, and whatever may be the height of the near angle of the cube in the drawing, as A G, the more remote angle, C B, being to repreſent an equal height ſeen at a greater diſtance, ſhould be made ſomewhat leſs than A B. In which caſe the horizontal lines of the top and bottom, G C and A B, will be inclined to each other, and would, if produced, meet; and being horizontal lines, or the repreſentations of horizontal lines, would meet ſomewhere in the horizontal line. Suppoſe the line V Z the place of the horizon, V would be the point of their union or tendency,

called their *vaniſhing point.* For the ſame reaſon the angular line E F, ſhould alſo be made leſs than the angle A B; and the point of tendency of the horizontal lines G E and A F, would alſo be in the horizon, at the point Z. The figure required, therefore, will nearly reſemble the figure here drawn, the figure A B C D E F[a].

[Plate 13.] Clearly to underſtand what we are about to do, is the firſt and fureſt ſtep to compaſs the end deſired. We are now going to obtain, by mechanical proceſs, the figure that the contour of a cube would make ſtanding over the ſquare A B C D, to the eye of an obſerver raiſed two inches above the point S; the point S, and the baſe of the cube, ſtanding on the ſame level plane.

Knowing the figure of its appearance from the ſketch, we will now obtain its *preciſe* form, according to principle, with ruler and compaſſes[b]. Draw the neceſſary operative lines (Fig. 14, Plate 10); Through the ſtation S, Fig. 1, draw the line X Y, parallel to the direction of the plane of delineation, G L; then the lines S G and S L, reſpectively parallel to the lines A B and A D of the baſe of the object, which lines, produced to the plane of delineation, determine the *vaniſhing points* of the horizontal lines A B and A D, and of all horizontal lines parallel to them. Draw the line S ⊙, perpendicular to G L; which line being the perpendicular direction of the eye to the plane of delineation, determines the point on the picture to which the eye ſhould be directly oppoſite to view it when done; and ſhows how much of the object is on the one ſide, and how much on the other, of the point of view. Laſtly, draw the viſual rays S B, S C, and S D, cutting the plane of delineation in the points b, c, and d.

Thus much is neceſſary for the preparation of the plan; the picture[c], or plane of delineation, is prepared, as follows. (See Figure 2.) Firſt, draw the

[a] I would recommend the Student to have three or four cubes, of about three inches ſquare, and adviſe that he apply them before him agreeably to the caſes as they occur, and firſt ſketch their appearance by the eye and hand alone, and after, perform the ſame by rule.

[b] The Student ſhould here put paper on his drawing-board, and ſet the very examples himſelf as they occur, and to a larger ſcale. In the preſent inſtance, he ſhould place the ſquare of the baſe of the object A B C D; then draw the line of the plane of delineation G L, fix his ſtation, S, and proceed with his drawing exactly as directed in the proceſs. Among many good advantages that will attend the ſo doing, will be one, not the leaſt, that of his not having a confuſion of lines at one time; for, drawing them only as directed, every thing will be clear and devoid of confuſion. It is otherwiſe with all the diagrams in the work; the preſent, for inſtance, includes four diſtinct Examples that will be ſeparately treated on, and has all the neceſſary lines drawn that relate to them, exhibited at once to view.

[c] The picture ſhould be made on a paper ſeparate from the plan, though here they are done all on one, to ſhow their connexion the more clearly, and for want of room.

ground line G L, and, parallel to it, and two inches above it[a], as ſtated, the horizontal line, V Z. Mark on the horizon the point ⊙, to which the eye is ſuppoſed to be perpendicularly oppoſite, to view the picture when done. Every other preparation is taken from the plan, and may be done in the order following. Set off the diſtances of the vaniſhing points ⊙ G and ⊙ L, Figure 1, on the horizon, Figure 2, at ⊙ V and ⊙ Z; alſo the ſeveral diſtances ⊙ b, ⊙ c, ⊙ A and ⊙ d, Figure 1, at ⊙b, ⊙ c, ⊙ A, and ⊙ d, on the ground line of the picture, Figure 2, through which points draw fine perpendicular lines, indefinite, which lines I will call viſual lines, and thus proceed. [Plate 13.]

As the near angle of the object, A, touches the plane of delineation, it is clear that that angular line, in the repreſentation, will be the ſame height as the object; that is, equal to the length A B or A D in the plan, Figure 1. Take therefore the length from A to B in the compaſſes, and apply it on the perpendicular line A B, Figure 2, and draw the lines B V and B Z; alſo A V and A Z, which cutting the other viſual lines in the points e, f, and h, i, determines the two perpendicular ſides of the cube A e f B and A B h i. Then draw the lines h V and f Z, interſecting each other in the point g, in the perpendicular line g c; which will complete the whole linear repreſentation of the cube A e f g h i. If the delineation A e f g h i were placed upright over the line G L (Figure 1), the line G L of the one, placed exactly on the line G L of the other, and the points b, c, A and d of the one, over the points b, c, A and d of the other, a ſolid cube put on the ſquare A B C D would exactly fit the figure A e f g h i, were it cut out, and viewed by an eye elevated two inches over the ſtation point S[b].

EXAMPLE II. [Plate 13.]

Let it be required to find the form that another cube would exhibit, when placed by the ſide of the firſt, and viewed from the ſame ſtation and point of view.

The ſquare B E F C, Fig. 1, is the baſe of the ſecond cube, and being poſited in the ſame direction, and parallel to the firſt, the ſame preparatory lines will ſerve; there only remains to draw the viſual rays E S and F S cutting the ground line G L in the points x and w.

[a] In this diagram it is two inches, but in that made by the Student it may be to three or four times the ſcale, that is, ſix or eight inches, or any height at pleaſure.

[b] The Student, provided with cubes, is adviſed to try this little experiment, when he has completed his drawing, and he will find it perfectly ſatisfactory.

[Plate 13.] The fame preparatory lines on the picture (Figure 2) will alfo ferve in this cafe. V Z will be the horizon, and Y, and Z, will be the vanifhing points of the horizontal lines. Take the diftances ⊙ w and ⊙ x, Figure 1, in the compaffes, and apply them at ⊙ w and ⊙ x, Figure 2, and draw the perpendicular vifual lines p w and n x, indefinitely.

The two cubes being in contact with each other, the angle over B is common to them both; and becaufe in the fame direction, the lines B V and A V, Figure 2, being drawn, determine the fide e k m f; which fide being obtained, draw then the lines m Z and g V, interfecting at n, and the figure of the fecond cube is determined, and is the figure e k m n g o. The fide e f g o, being in contact with the firft cube, cannot be feen unlefs the bodies were tranfparent.

EXAMPLE III.

It is required to find the figure that a cube would exhibit, if, placed over the fquare BEFC, *Figure* 1, *it was viewed by an eye two inches above the ftation* S, *the plane of the picture ftanding perpendicularly over the line* G L.

Note, The Student is defired to pay particular attention to this propofition, and view it as a new example under the ftated premifes.

Draw the lines S G and S L parallel to the fides of the object B E and BC, in order to obtain their vanifhing points, G and L. Draw the vifual rays E S, B S, F S, and C S, cutting the ground line G L in the points x, b, w, and c; and produce the line of the object, E B, till it interfects the ground line in the point A. Laftly, draw the line S ⊙ perpendicular to the line G L.

Prepare the picture, Figure 2, by drawing the ground line G L, and parallel to it, and two inches above it, the horizontal line V Z. Fix the point ⊙ in the horizon, the point oppofite the point of fight[a]; and alfo the point ⊙ in the ground line, directly under it. Set off the diftances of the vanifhing points G and L, Figure 1, at V and Z, Figure 2; alfo the feveral diftances ⊙ x, ⊙b, ⊙ w, and ⊙ c, Figure 1, at ⊙ x, ⊙ b, ⊙ w, and ⊙ c, Figure 2, and draw fine perpendicular lines, in pencil, through them.

Becaufe the near angle of the object is at a diftance from the picture, it will not be reprefented on the picture, its full height; that is, equal to the real height of the object; that is done only when the object touches the plane of delineation;

[a] That point, on the picture, is often called the CENTRE OF THE PICTURE, meaning thereby that the point of fight fhould be directly oppofite it, at its proper diftance; and for the future, for the fake of brevity, it fhall be fo called, throughout the work. See Definition 8.

as it did in the firſt example at the angle A. Its reduced height therefore, agreeable to its diſtance from the picture, muſt be obtained; and which is very readily done as follows: [Plate 13.]

If the plane of the object, in the direction of the line E B, Figure 1, were continued forward, it would touch the plane of the picture in a perpendicular line over the point A, and would there mark its height. Let that be done, by producing the line E B to A; then ſet off the diſtance ⊙ A, Fig. 1, at ⊙ A, Fig. 2, and draw the line A B, Fig. 2, indefinite. The line A B is the interſecting line of the plane of the object in the direction of the line B E, Fig. 1 (Def. 13).

Proceed on the picture in the following manner; on the interſecting line A B, make A B equal the height of the object, and draw the lines B V, and A V, which, croſſing the viſual lines b f and x m, determine the plane e k m f, for the repreſentation of the plane of the object over the line E B, Fig. 1, from which part the whole figure is ſoon obtained. By drawing the lines f Z and e Z, the plane e f g o is determined, and drawing the lines m Z and g V, the top of the cube, f m n g, is found, and the whole figure, e k m n g o, is completed, which is in the linear repreſentation of the object. Reflection will immediately point out, that the figure but juſt now obtained, muſt be the ſame with the one found by the ſecond example, which was done by means of the angle e f, of the firſt cube; 'tis only ſuppoſing the firſt taken away, and the ſecond left by itſelf.

When neither ſide of the object touches the plane of the picture, it is immaterial, as to the performing of the operation, which ſide is produced for an interſecting line; choice only ſhould be made of that which will leaſt interfere with the work. In the example, juſt performed, the ſide E B was produced for an interſection, as at A, but the ſide B C might as well have been produced [a]; let it be ſo done, as at K, Fig. 1, and mark off the diſtance ⊙ K, at ⊙ K, Fig. 2, where make the height K M equal the height of the object, that is, equal to the height A B, and draw the lines M Z, and K Z, which will fall in with the before-found lines f g and e o, and form the plane e f g o; from which the whole figure could readily be completed, as may be obſerved from inſpection.

EXAMPLE IV.

It is required to give the repreſentation of a cube as being placed directly upon the one found by the former example, that is, upon the cube ſtanding on the ſquare B E F C, *under the premiſes ſtated, with the laſt example.*

The ſame preparatory lines in plan and picture, with the laſt, will ſerve in

[a] The Student is deſired to draw the whole figure by means of that interſection, that he may be convinced of the truth of either proceſs, and of the coincidence of both.

[Plate 13.] this example. In Fig. 2, lengthen the viſual lines k m, e f, and o g, to p, q, and r; then proceed as follows:

Set up the height of the cube on the interſecting line A B H, Fig. 2, above the height of the firſt, that is, make B H equal B A, and draw the lines H V, and q Z cutting the viſual lines in the points q, p, and r, giving the figure f m p q r g for the contour of the required cube; which riſing above the horizon, the top is not ſeen, and the horizontal lines p q, and q r, decline to their vaniſhing points V and Z.

The Student is adviſed to place three cubes, agreeably to the diſpoſition of the three cubes forming the group, Figure 2; and, having ſo placed them, to draw their appearance by the hand and eye, as nearly as poſſible from the ſame point of view; afterwards to draw them as one example correctly by rule.

The linear repreſentations only, of the cubes have been deſcribed, but the aſſiſtance of ſhade has been given, that their forms might be the better diſcerned; and the Student is adviſed to colour each of his operations, as they are performed. A double advantage will thereby be obtained, that of embodying his linear figures, and gaining a freedom of ſhadowing and tinting at the ſame time.

If it ſhould be ſuggeſted, of what advantage can the drawing of cubes placed in ſuch or ſuch poſitions be? I can only anſwer, that, from the ſimplicity of their forms, they are given as firſt examples; but though ſimple, they may nevertheleſs compriſe the forms of irregular and picturеſque figures, as well as regular and formal ones, of which Figure 3 may ſerve as an inſtance, and is given to intimate that a ſubject of difficulty may be derived from a ſubject of much apparent ſimplicity.

There can be but two ways of placing a cube, in a vertical poſition, to the plane of delineation, and thoſe are, either with both ſides inclined to it, as has already been four times done, or with one ſide parallel to it, and the other, of conſequence, perpendicular to it. Inclined poſitions have been given; we will now proceed to delineate a parallel one.

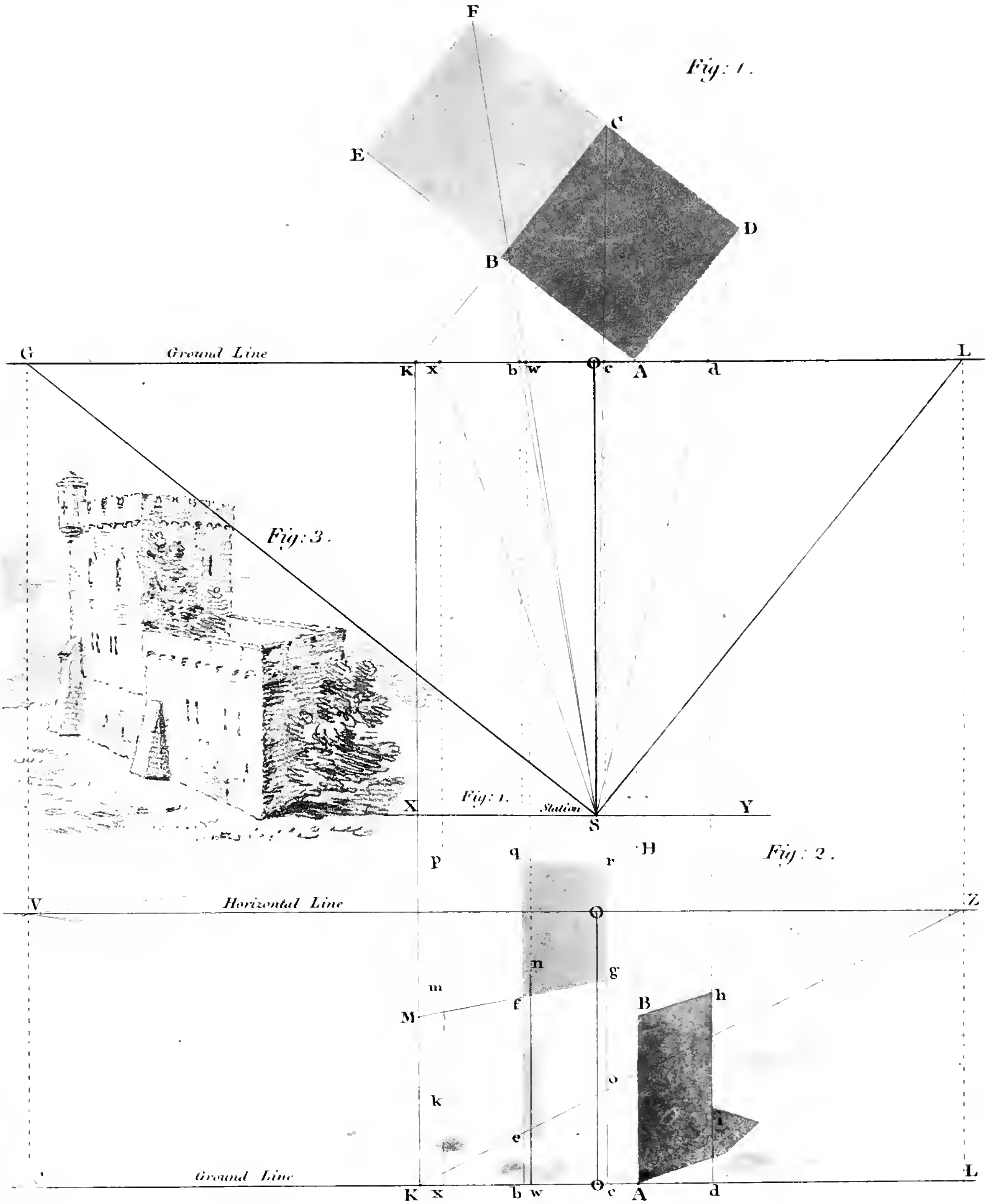
[Plate 14.]

EXAMPLE V.

It is required to find the appearance that a cube would make, on the plane of delineation, when placed with one ſide parallel to that plane.

Let the ſquare A B C D, Figure 1, Plate 14, be the ſituation of the cube; the line G L, the poſition of the plane of delineation, parallel to the face of the cube over the line A B; and let S be the ſtation of the obſerver.

If the face B A of the cube, touched the plane of delineation, it is clear, a ſquare, equal to the ſquare A B C D, Figure 1, would be the repreſentation of



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that ſquare; but it is at a little diſtance from it; conſequently, though it will be a ſquare, as being a parallel ſection of the pyramid of viſion, it will be a ſomewhat ſmaller ſquare than the face of the cube, and ſmaller in juſt proportion to its diſtance from the picture. To aſcertain which, it is neceſſary to have an interſection of ſome plane of the object with the picture, as of A D in the point I. Draw the line S ⊙ perpendicular to the ground line G L, ⊙ will be the vaniſhing point of the line A D and of all lines parallel to it; alſo draw the viſual rays A S, B S, C S, and D S, cutting the ground line, in the points b, c, a, and d. [Plate 14.]

Prepare the picture (Figure 2), as follows: Draw the ground line G L, and parallel to it, and at any height at pleaſure, the line Y Z, for the horizontal line. Mark the point ⊙, the centre of the picture, on the horizon, and alſo the point ⊙ perpendicularly under it, on the ground line. Set off the ſeveral diſtances of the viſual interſections, ⊙ b, ⊙ c, ⊙ I, ⊙ a, and ⊙ d, Fig. 1, at ⊙ b, ⊙ c, ⊙ I, ⊙ a, and ⊙ d, Fig. 2, and draw fine pencil lines perpendicularly through them, upwards on the picture.

The line drawn through the point I, is the interſecting line, on which mark the height of the cube, as I K, equal to a ſide of the cube in the plan, as A B, Fig. 1, and draw the lines K ⊙ and I ⊙, Fig. 2, cutting the viſual lines a n, and d i, in the points n, i, and e, k, forming the plane e n i k, as the repreſentative face of the cube, over the line A D in the Plan. Parallel to the horizon draw the lines n g and e f, determining the ſquare e f g n, as the repreſentative ſquare over the line B A in the plan, Fig. 1. Laſtly, draw the lines g ⊙ and i h, interſecting in the point h, forming the figure n g h i, as the top of the cube, and giving the figure e f g h i k, as the linear repreſentation of the whole cube, under the premiſes ſtated.

EXAMPLE VI.

Figure 3 repreſents the plan of three rectangular ſolids, placed ſide by ſide, forming the general figure E F H K.

It is required to find their repreſentation, ſuppoſing them to ſtand with both faces inclined to the plane of delineation, which is given in the place and direction of the line G L, *and* S *is the ſtation of the obſerver.*

Draw the preparatory lines; firſt the line W X, parallel to the ground line G L, then the line S ⊙ perpendicular to it; alſo the viſual rays F S, P S, N S, E S, M S, and K S, cutting the ground line in the points e, f, g, h, i and k; and produce the face of the object F E, to B, for an interſection. Laſtly, draw the

[Plate 14.] lines S V, and S R, refpectively parallel to the two faces of the object E F and EK, to obtain their vanifhing points.

It will be obferved, that there is not extent enough of paper for the line of the picture, G L, and the line S R, to come in contact; in fuch cafe an expedient muft be ufed. Take any portion of the diftance of the picture S ⊙, fuppofe half, as at m, and draw the line m L parallel to S R; then will the diftance ⊙ L be half the diftance of the required vanifhing point. Should the line at half the diftance not come within the limits of the paper, then let a third or a fourth of the diftance be taken; the parallel line being drawn, will give a proportional diftance of the vanifhing point.

Let the line B C, Fig. 4, be the direction of the plane of the picture, let A be the ftation point, A C will be the diftance of the picture. Let A B be the direction of a line finding a vanifhing point at B. Divide the diftance of the picture into two equal parts at D, and draw the line D E parallel to A B; then will the diftance C E be *half* the diftance C B. Take a third part of the diftance A C, at F, and draw F G parallel to A B; then will G C be a *third* part of the diftance B C. Thus whatever portion is taken of the one, drawing the parallel line will give a like portion of the other, for the triangles formed are fimilar, and the correfponding fides will therefore be proportional.

Prepare the picture[a] Fig. 5; that is, draw the horizontal line Y Z, and the ground line G L, parallel to each other, at any diftance at pleafure. Fix on the point , in the horizon, for the centre of the picture, and draw the vertical line ⊙ ⊙. Set off the diftance of the interfecting point B, Fig. 3, and of the vifual points ⊙ e, ⊙ f, ⊙ g, ⊙ h, ⊙ i, and ⊙ k, at A, and ⊙ e, ⊙ f, ⊙ g, ⊙ h, ⊙ i and ⊙ k, Fig. 5, and draw the vifual lines through them. Laftly, fet off the diftance of the vanifhing point V, Fig. 3, at P, Fig. 5, and the diftance of the vanifhing point Z, Fig. 5, at twice the diftance ⊙ L, Fig. 3[b]; and proceed in the following manner:

On the interfecting line A C[c], Fig. 5, fet up the height of the object, which fuppofe A B, and draw the lines A P and B P, cutting the perpendicular vifual

[a] Preparation of the picture, always implies, firft, determining the diftance of the horizontal and ground lines (Def. 7 and 11). Secondly, the fixing on the centre of the picture (Def. 8), and drawing the vertical line (Def. 9). Thirdly, the fetting off the diftances of the vanifhing points (Def. 14), and fetting off the diftances of the interfections of the vifual rays, with the ground line, in the plan, on the ground line of the picture; and this is defired to be underftood and done in future, on the being told to prepare the picture.

[b] It is abfolutely neceffary, without having recourfe to a very troublefome procefs, which fhall be given in the courfe of the work, to have the places of the vanifhing points, on the picture, that the relative lines may be drawn in true direction to them. When the paper, or drawing-board, is not long enough to receive them on it, a piece muft be added, as here, or a lath muft be fixed to the board; where, placing a pin in the vanifhing points, a ruler may be laid to them, and the work may be done with as much accuracy, as were they not above a foot diftance.

[c] The Student will obferve, that when by reference one courfe of the alphabet has been exhaufted, I have been of neceffity reduced to begin another; by which the fame letter will be fometimes twice or thrice repeated in the fame plate; but by being ufed in parts remote from each other, it is hoped all confufion will be avoided. I think fuch proceeding better, than having recourfe to Italic, or Greek letters, as fome authors have done; by which, the Student, not acquainted with Greek characters, is quite at a lofs what to call them.

lines, and determining the figure a b c d, for the reprefentation of the face of the object over the line E F, Fig. 3; then draw the lines d Z and a Z, which will obtain the plane of the end of the object a d n o; and laftly draw the lines c Z and n P, interfecting at m, and completing the figure a b c m n o; the figure required. By drawing the lines x Z and v Z, the whole figure is divided into three parts, agreeable to the three rectangles in the plan, Fig. 3. [Plate 14.]

EXAMPLE VII.

It is required to find an equal and like figure to one of the foregoing, as if placed on the fecond of the three figures of the laft example.

As this example introduces no new pofition of plane in the original object, the fame preparatory lines will anfwer, as in the former example; and as all the vifual lines are already drawn, it is neceffary only to heighten them.

On the interfecting line A C, Fig. 5, fet up the height B C equal B A, and draw the line C P; determining the plane v x p q for the front of the required reprefentation; after, draw the lines p r and q s to their vanifhing point, Z, giving the plane v q s t, as the other fide of the object; to which the top is added by drawing the line s P, fhaping the figure q p r s, for the top; and completing the form v x p r s t, the reprefentation required.

The top of the object q p r s, Fig. 5, being very near the horizon, is, of confequence, very little feen; had the object been higher, ftill lefs would have been vifible; had it fallen in with the horizon, that is, had B T and not B C been the height of the object, none of the top could have been feen, but its reprefentation would have been a line in the direction of the horizon.

Fig. 6 is meant to fhow what the compound of the two laft fimple examples might involve; and is introduced to encourage the Student in his purfuit, by giving a foretafte of the refult of his labours, and to inftance that while he is applying rules and principles upon, feemingly, very uninterefting objects, the fame extend to and embrace irregular and picturefque ones.

Hitherto the examples have united as few different directions of planes, forming a folid figure, as could well be given; they may be fuppofed to have been buildings with flat or no roofs; it is now my intention to introduce other directions of planes, as inclined roofs; and thefe in fome variety.

Roofs are of various kinds, but two only are neceffary to be obferved upon here, and thefe are what are called gable-end roofs, and hipped roofs. A gable-end roof, is when the end walls of the building go perpendicularly up to the point of the ridge, and the ridge extends from end to end of the building.

[Plate 15.] The upper part of the end walls are therefore of a triangular form, to the depth the roof ſlants down. ABCDE, Fig. 1, Plate 15, repreſents the end wall of a gable-end roof; CDE being the triangular part formed by the roof. A roof is ſaid to be hipped when the ridge comes ſhort of the extent of the building and ſlants down on every ſide; AEFGH, Fig. 2, may convey the idea of a hipped roof; and both one and the other be further explained by Fig. 3, where the line IK indicates the ridge of a gable-end roof, and OP the ridge of a hipped one; and OM and PN the ſlant at the ends. A roof may have one end gable and the other hipped, and is often ſo conſtructed.

EXAMPLE VIII.

It is required the repreſentation of a quadrangular building ſituated with each ſide inclined to the picture, covered with an A[a] roof, each end being a gable-end.

Let the rectangle ABCD, Fig. 4, be the plan of the building; the line EF will be the place of the ridge of the roof, extending from end to end. Let the line QL be the place of the plane of delineation, and let S be the ſtation point.

Find ⊙, the centre of the picture; alſo the points Q and L, the vaniſhing points of the lines AB and AD and their parallels. Produce the face of the building AD to I for an interſection with the picture; and draw the viſual rays interſecting the ground line of the picture in the points b, e, a, f, and d[b].

Prepare the picture, Fig. 5, by drawing the horizontal and ground lines VZ, and GR, at any diſtance from each other at pleaſure; fix upon the centre of the picture ⊙; and draw the vertical line ⊙ ⊙; ſet off the diſtances of the vaniſhing points ⊙ V and ⊙ Z, equal the diſtances of the vaniſhing points ⊙ Q and ⊙ L in Fig. 4; draw the interſecting line IL, Fig. 5; and all the viſual lines through the points b, e, a, f and d, taken from their reſpective places and diſtances b, e, a, f, and d, Fig. 4; and proceed as follows:

On the interſecting line IL, Fig. 5, ſet up the height IK, equal the height of the building BC or HG, Fig. 1 and 2; and draw the lines KZ and IZ, determining the plane gmop, for the front of the building. Draw the lines

[a] A ſingle pitched roof is conſtructed in the form of the Roman capital letter A, and is therefore, by builders, called an A roof. A double pitched roof is, for the ſame reaſon, called an M roof, as it nearly reſembles that letter; but is more like the letter W, inverted, thus ʍ.

[b] It is not neceſſary to draw the viſual rays beyond their interſection with the ground line of the picture: it is ſufficient they be drawn to there, in the direction to the ſtation point; for the future, therefore, they will be drawn no farther, and the ſtation being fixed, and expreſſed on any part of the plate, it will be ſufficient the viſual rays be drawn to the picture in direction to that point.

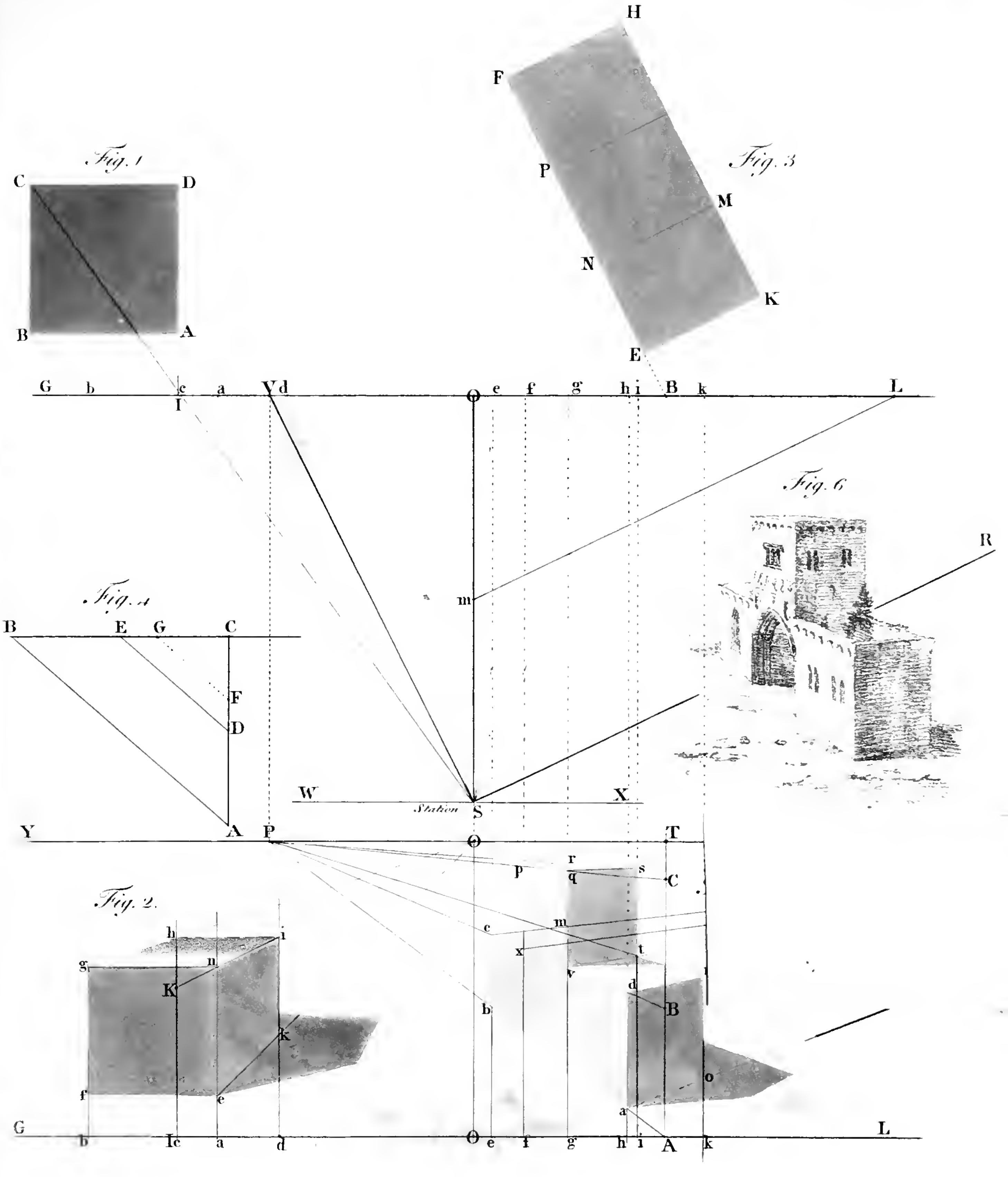


Fig. 1
Fig. 3
Fig. 6
Fig. 4
Fig. 2
Station

m V and g V, determining the end of the building g h i m. It now remains to place the roof, which is readily done, but which however requires ſome circumſpection in the proceſs. [Plate 15.]

Place the height of the roof X D, Fig. 1, on the interſecting line at I L, Fig. 5, and draw L Z, which will give the height of the roof on the angular line of the building g m, at r; from which ſpot it may readily be transferred to its proper place in the viſual line e k, by the line r V, which cuts the line e k in the point k, the point required. From the point k draw the lines k i, and k m, completing the gable-end of the building. Draw the ridge of the roof k Z cutting the end viſual line, in the point n; and laſtly, draw the line n o, completing the whole linear delineation of the building g h i k n o p.

It muſt be carefully obſerved, that whatever original plane is produced to the picture to obtain an interſection, that that interſection ſerves only to obtain heights in the direction of that plane; whence they may be transferred to other planes in contact with it; as in the preſent inſtance. The interſecting line I L, Fig. 5, is the interſecting line of the plane g m o p; of conſequence, any original height ſet up on that line can only be transferred throughout the direction of that plane; for inſtance, the height of the roof K L was transferred by the line L Z, all along that plane to its other extremity s, but the line r s is not the place of the ridge of the roof, which lies in the middle of the plane g h i k m, proceeding from the point k; but any height on the angular line g r, is eaſily transferred along that plane by means of its horizontal vaniſhing point V: by which means the height of the roof was obtained by the line r V, at k. If, inſtead of the plane over the line A D, Fig. 4, being produced for an interſection, the plane of the middle of the houſe in the direction of the ridge of the roof, had been drawn, and the height of the roof had been ſet up on that line, it would, at one application, be transferred to its proper place.

Let the line F E, Fig. 4, be produced to P for an interſection; ſet off the diſtance ⊙ P, at ⊙ P, Fig. 5; and draw the interſecting line P R. On P R, ſet up the height of the ridge of the roof, equal the height X D, Fig. 1, and draw the ridge line R Z, which line will determine the exact ridge of the roof between the proper viſual lines, and will be found to correſpond, exactly, with the ridge before obtained, by the former proceſs.

The roof may be found by a very different proceſs*. I do not ſhow it for its beauty alone, though that is great, or for its utility either, but to manifeſt the truth of the rules of Perſpective, by experience of their juſt coincidence.

The ſlant lines of the roof will have their vaniſhing points on the picture, as well as any other direction of lines in the ſame object. The line k m, Fig. 5, being in the vertical plane g h i k m, will have its vaniſhing point ſomewhere in the vaniſhing line of that plane (Def. 15). A vertical line drawn through the horizontal vaniſhing point V, will be the vaniſhing line of the plane g h i k m;

* If the Student poſſeſs not a conſiderable degree of diſcernment, and quick penetration, it will require ſome ſerious inveſtigation ere this proceſs be fully comprehended, which, in truth, it is almoſt impoſſible to make perfectly clear without proper apparatus, and perſonal explanation.

[Plate 15.] of confequence, the vanifhing points of the lines k m, k i, and all lines parallel to them, will be fomewhere in the vertical line G V Q X.

Two lines drawn from the eye, parallel to any two lines in an object, finding their vanifhing points, will make the fame angle at the eye, as the lines in the object make with each other; for the two lines in the one inftance are refpectively parallel to the two lines in the other.

The line S Q, is drawn from the ftation S, parallel to the line A B, Fig. 4, and a line drawn from the ftation S, making the fame angle with S Q, as E D does with E C, Fig. 1, will find the vanifhing point of the line E D, and which point muft evidently be fomewhere in a vertical line through the point Q. To obtain which point in practice, take the diftance of the vanifhing line it is in, that is, the length from S to Q, in the compaffes, and fet off the fame on the horizon, Fig. 5, from V to W. At the point W make an angle, V W X, equal to the inclination of the roof, that is, equal to the angle C E D, Fig. 1, and produce the line till it interfects the vertical line through the vanifhing point V, in the horizon, in the point X. The point X will be the vanifhing point of the line of the roof k m, Fig. 5; and of the line n o, parallel to it. The flant lines of the roof k m and n o, already obtained, will, on application of a ruler, be found to tend to the point X, agreeably to the above ftatement.

By the fame reafoning the line of the roof k i, Fig. 5, will alfo have its vanifhing point, and in the fame vertical line G V Q. It will be found to be as much below the horizontal vanifhing point V, as the point X is above it. See the plate explaining the definitions, under the article Vanifhing Point; Def. 14.

Let the line A B, Fig. 6, be the line of the horizon; let the line C D be the vanifhing line of a vertical plane, being the gable-end of a houfe; and let the angle A B C be the angle of inclination, finding the vanifhing point of the flant lines of a roof in one direction. Let the line B D be the line, finding the vanifhing point of the flant lines in the other direction, having the fame inclination to an horizontal line: then will the angle A B D be equal the angle A B C, and the diftance A D equal the diftance A C.

EXAMPLE IX.

It is required to find the reprefentation of a quadrangular building, fituated inclined to the picture, covered with a fingle hipped roof.

Let the quadrangle G D H K, Fig. 7, be the plan of the building, the line M N will reprefent the ridge of the roof. The former line Q L may be the

place of the plane of delineation, and it may be viewed from the ſame ſtation S. [Plate 15.]

The poſition and direction of the lines of this object being the ſame as thoſe of the former example, the preparatory lines that ſerved the preceding, will anſwer for this. It is requiſite only to draw the viſual rays MS, NS, GS, PS, and KS, interſecting the picture in the points m, n, g, p, and k; and to produce the line DG, for an interſecting point, at R.

Prepare the picture, Fig. 8. Let the line VZ be the horizon; GR the ground line; ⊙ the centre of the picture; and the points m, n, g, p, and k, the correſponding points with m, n, g, p, and k, Fig. 7. Draw the viſual lines through thoſe points, and the interſecting point R, and proceed as follows:

On the interſecting line RE ſet up the height RT, equal the height of the object HG, Fig. 2, and draw the lines TV and RV, cutting the viſual lines of the front of the building in the points z and o, y and p, determining the plane ypoz, for the repreſentation of the plane of the front: from the angular points z and y, draw the lines zw and yx, to their vaniſhing point Z, determining the plane yzwx for the end of the building.

On the interſecting line, ſet up the height of the roof TE, equal the height NK, Fig. 3, and draw EV cutting the angular viſual line of the building in the point e; from which point draw the line eZ, cutting the viſual line pa, in the point a, the point of direction of the ridge of the roof; draw the line aV, which, cutting the viſual lines through the points m and n, in the points t and v, determines the exact portion of the ridge of the roof, tv, which is the repreſentation of OP, Fig. 3, or of the ridge MN, Fig. 7: draw the lines to, vz, and vw, which will complete the whole repreſentation required[a].

In Fig. 8. If the lines az and aw be drawn, they will form a gable-end yzawx, of which the point a is the point of the gable, and will anſwer for the direction of the ridge, whether it be a gable-end, or a hipped roof; for in both caſes it lies in the middle of the breadth of the houſe; wherefore the line aV anſwers as well the ridge of a hipped roof, as of a gable-end.

On examination of the plans of the two buildings, Figures 4 and 7, it will be obſerved, that they are placed at right angles with each other, and in contact at the point D; which being the caſe, the ſecond example could have been eaſily accompliſhed from the firſt, without need of another interſection, or other preparatory lines, than merely the additional viſual rays from the viſible

[a] The Student is particularly adviſed to be ſure he *perfectly* underſtands the proceſs of theſe two examples ere he proceeds farther; as all that will follow, will, more or leſs, have relation to them. He is recommended to practiſe them on a large ſcale, that he may the better ſee the affinity and relation the lines and planes have to one another; and to be very careful in the proceſs.

angles of the ſtructure; but the exemplification of this proceſs ſhall be made part of the ſubject of the next example.

[Plate 16.]

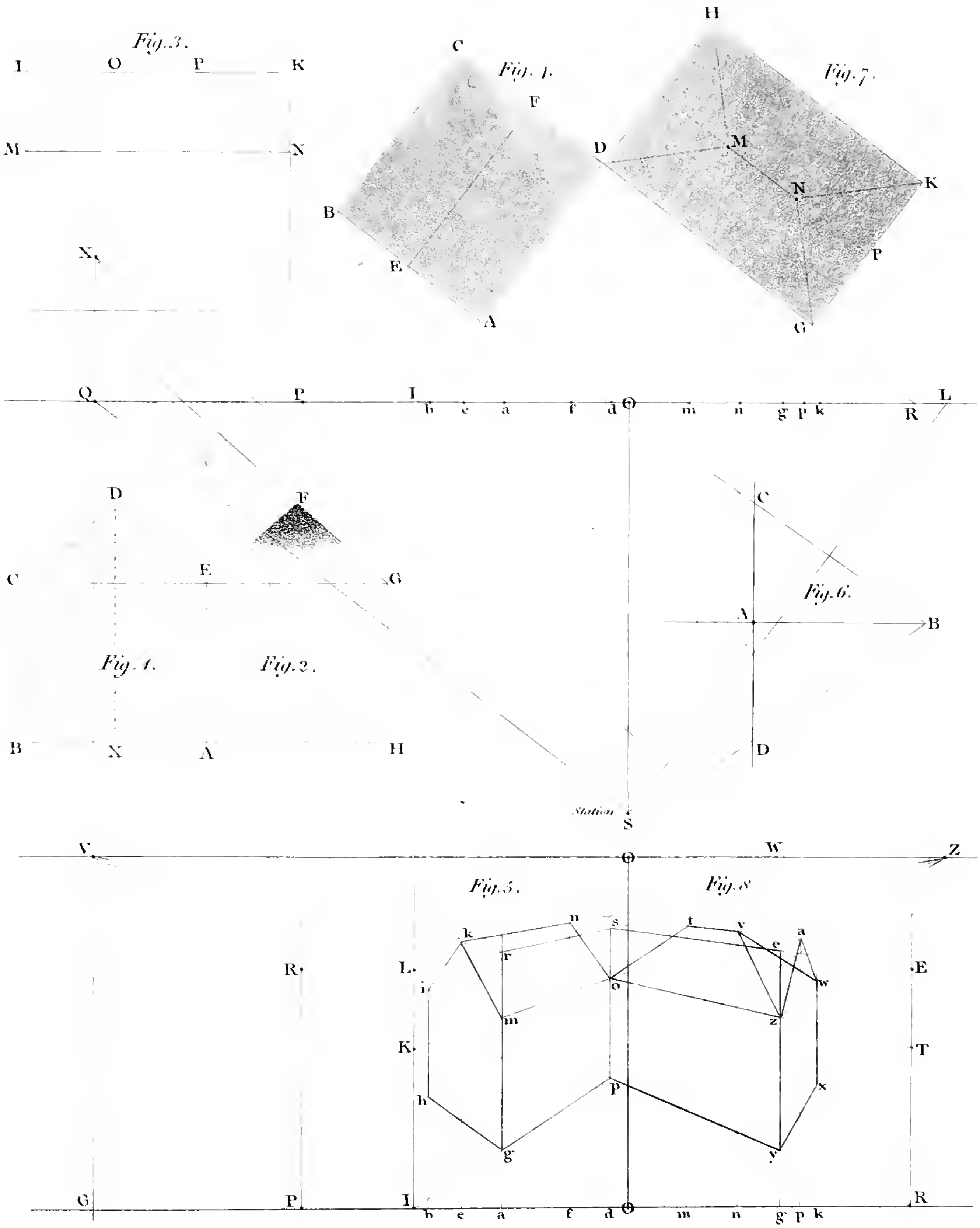
EXAMPLE X.

Let the form A B C D E F, Fig. 1, Plate 16, be the general plan of a building, of which, let the ſquare F G C H be the plan of a tower, and the other two parts A B G F and E F H D be ſubordinate parts, with gable-end roofs, and reſting againſt the ſides of the tower. Fig. 2, is a geometrical elevation of the building; I K L M the height and breadth of the tower; O N the height of the roof of the lower building, and O P the height of the upright walls.

It is required to find the repreſentation of the above building, as it ſtands poſited to the plane of delineation at the line R T, *from the ſtation* S.

Find the vaniſhing points R, and T, by lines from the ſtation drawn parallel to the different faces of the building; alſo the centre of the picture ⊙; produce the line F E to X, for an interſection; and draw all the neceſſary viſual rays. Prepare the picture, Fig. 3. Let V Z be the horizon; ⊙ the centre of the picture; V and Z the vaniſhing points of the horizontal lines; G L the ground line, and ⊙ ⊙ the vertical line. Set off the diſtances of the points b, a, g, f, n, h, e, d, and X, Fig. 1, at b, a, g, f, n, h, e, d, and X, Fig. 3, and draw fine uplines through them indefinitely; then proceed as follows:

On the interſecting line X T, Fig. 3, ſet up the height X Y, equal the height of the walls of the building O P, Fig. 2. Alſo the height Y W, equal the height of the roof P N, Fig. 2; and draw the lines X i, Y k, and W v, to the ſame vaniſhing point, V; determining the plane of the building u i k m, and the height of the roof on the angular line, at v. From the points v, m, and u, draw the lines v Z, m Z, and u Z, obtaining the height of the roof, at o, in its viſual line; and by drawing the lines o m and o p, the whole gable-end u m o p q is completed. Draw the ridge of the roof o z, cutting the end viſual line n, in the point z, and draw the line z k; then is the whole building over the plan E F H D, Fig. 1, completed; from which the other parts may readily be projected. Draw the lines k s, and i r, by direction to their vaniſhing point, Z; alſo the lines s y, and r t, by tendency to their vaniſhing point, V. In the plan Fig. 1, produce the ridges of the two roofs till they meet, at the point K; from which point draw the viſual ray K l, agreeable to which interſection, draw a viſual line at l on the picture, Fig. 3; to which line produce the ridge of the roof o z, touching it at c; from c draw the line c w, tending to the vaniſhing point Z, cutting the viſual lines of the ridge of that building in the points w and x; w x



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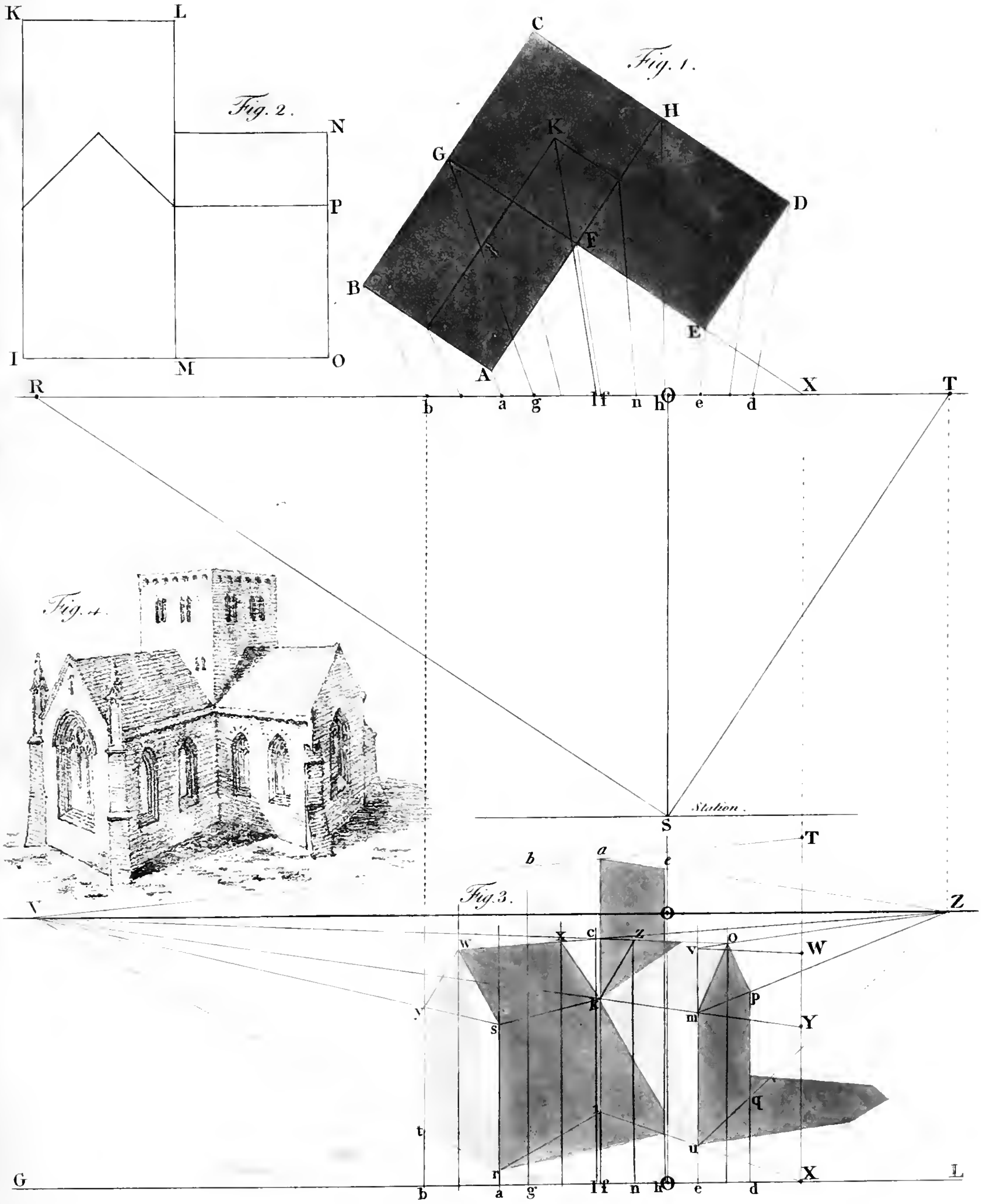

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is the ridge of the roof. Draw the lines wy, w s, and x k, completing the other building, over the plan A B G F, Fig. 1. The delineattion of the tower is ſoon accompliſhed: on the interſecting line X T, make the height X T, equal the height of the tower M L, Fig. 2, and draw the line T V, cutting the viſual lines of that face of the tower, in the points *a* and *b*; from the angular point *a*, draw *a* Z, cutting the other viſual line of the tower in the point *e*, which will complete the whole of the required repreſentation. [Plate 16.]

Fig. 4 is introduced to ſhow to what a complicated object, ſuch a figure, as is juſt now obtained, may apply. I will give one more example on the true delineation of roofs, and then proceed to other objects.

EXAMPLE XI. [Plate 17.]

Let the figure F A B C D (Fig. 1, Pl. 17) be the plan of a building, the ridge of whoſe roof let be the line H I K; forming a gable-end at the face A B, and a hip at the end E D Let Fig. 2 be the geometrical elevation of the ſaid building, expreſſing the ſeveral heights; and let P O be the height of the horizon.

It is required to find the figure ſuch building would preſent, ſtanding in the poſition and place it does, to the plane of delineation over the line V Z, *from the ſtation* S; *the point of ſight being equal the height from* P *to* O, *Fig.* 2.

Obtain the centre of the picture ⊙, as alſo the vaniſhing points of the different directions of horizontal lines in the building V, and Z; draw all the viſual rays from the viſible angles of the building, cutting the ground line in the points b, h, a, g, i, k, e, t, d; and produce the face G E to R, for an interſection.

Prepare the picture, by drawing the horizontal and ground lines X Y and G L, parallel to each other and diſtant equal the height P O (Fig. 2); fix the diſtances of the vaniſhing points, and place the centre of the picture, on the horizontal line Fig. 3 at X, Y, and ⊙; alſo ſet off the diſtances of the viſual interſections at Fig. 1, at the correſponding diſtances, Fig. 3, and draw the viſual lines perpendicularly through them.

On the interſecting line, R D, ſet up the ſeveral heights of the building R A, R B, R C, and R D, equal the geometrical heights L m, r n, L W, and L M, of the elevation, Fig. 2, and proceed with the delineation, as follows. The height R C, on the interſecting line, Fig. 3, is the height of the upright walls; deſcribe it around the building, by means of the vaniſhing points, to the ſeveral viſual lines, in the points r, x, w, v, and s; and deſcribe the bottom line of the building, to the ſame viſual lines by means of the point R. The height of the roof, from the point D, may alſo readily be transferred to its proper place, as follows; Firſt, to the extreme viſual line in that direction of the wall of the

[Plate 17.] building, in the point c; whence convey it to the angular viſual line through the point a, at f, by means of the vaniſhing point Y; and thence to its proper viſual line through the point h, at m, determining the point of the gable-end, which the lines m v, and m w, complete. From the point of the gable, m, draw the ridge, m n, to its vaniſhing point Y; and the return of the ridge, n o, to its vaniſhing point, X: draw the hip lines o r, and o s; and the line n x, and the whole roof will be completed.

The ſhed, or lean-to, is obtained from its heights A and B; as may clearly and ſatisfactorily be ſeen, from examination of the figure.

The truth of delineation, that is, drawing agreeably to the ſtricteſt perſpective, is unqueſtionably as requiſite to be attended to in deſcribing old and decayed objects, as in tracing the moſt perfect. Without due attention to truth in the delineation of the former, they may be moſt prepoſterouſly repreſented. It is not becauſe being inclined, being really out of perpendicular, that they may be made to incline any how; they muſt be made ſo with judgment.

It is an adviſable method to delineate a rude object, of any importance, truly, as if quite perfect, and then deſtroy it at pleaſure, tempering the ſtroke of ruin with the hand of judgment. For inſtance, in the ſubject but juſt truly delineated (Fig. 3), and ſhown in a pictureſque manner (Fig. 5); let it firſt be delineated ſtrictly correct, in pencil, with every angle and boundary made perfectly ſharp and regular, as is expreſſed by the ſharp lines, Fig. 4; then, with the deſtroying hand of time, trace the rougher figure there drawn around it. The rude figure is not leſs under the governance of perſpective than the perfect one, but only leſs indicative of abſolute departure from truth. A tree is delineated perſpectively when delineated properly. "Delineate a tree agreeably to rule," I was told by a gentleman[a] to whom I made the obſervation, and who well underſtood perſpective, and much admired it. "I will, my Lord," I replied, "if you will draw its geometrical plan and elevations."

It is a very pleaſurable proceſs, the breaking down a regularly drawn ſubject into ruin; and it is done with the more ſatisfaction when it is performed with confidence, ſenſible at the ſame time it is not random work, but that it is true delineation governed by rule and judgment.

Thus far advanced, having gained conſiderable information on right-angled, or ſquare objects, it is now expedient to turn attention to round ones, and from them make reference to many-angled ones, as hexagons and octagons.

[a] The late Lord Mountjoy, ſo lamentably killed, during the Rebellion in Ireland in 1798, at the battle of Roſs.

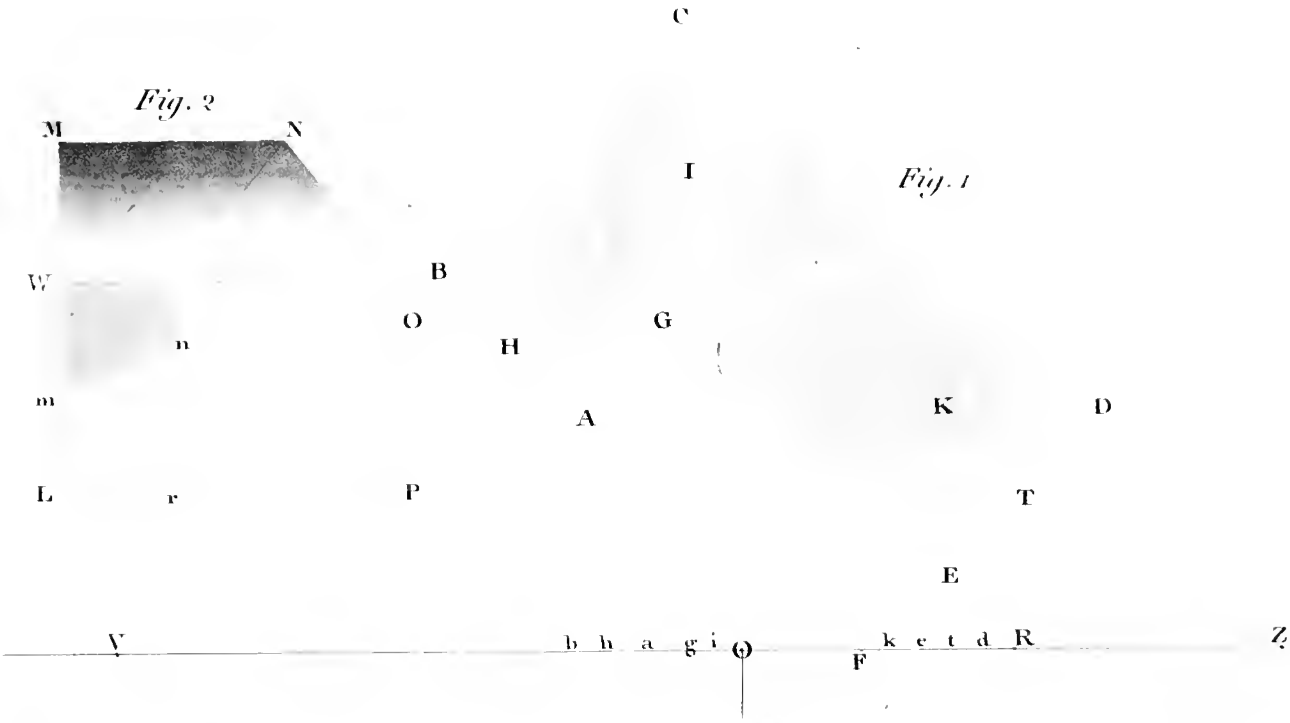


Fig. 2

Fig. 1

Fig. 4

Fig. 5

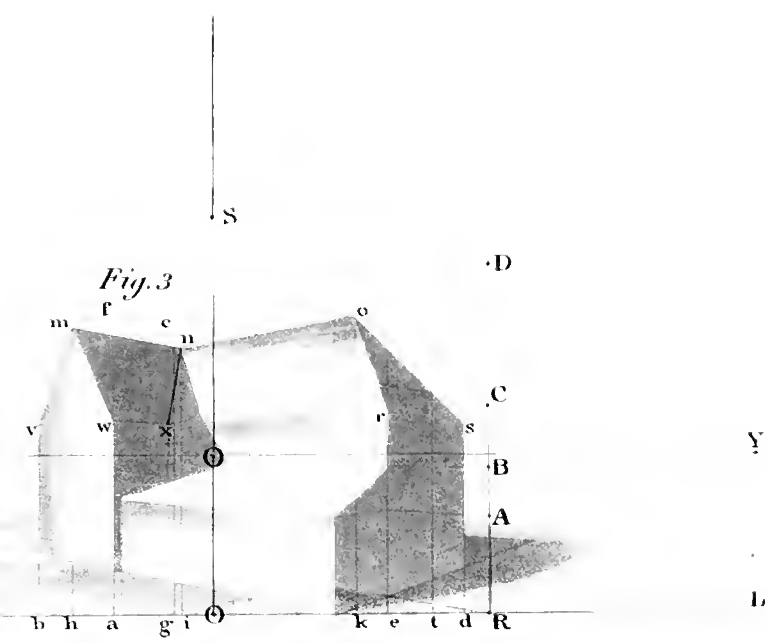


Fig. 3

Pub'lished by T. Malton Oct^r 1^st 1800

I know not for what reafon writers on perfpective commonly divide the fubject of linear delineation into two parts, which they term rectilinear and curvilinear; there feems to be an evident impropriety in this divifion of the fubject, fince the fame procefs, fimply, is followed in both cafes in determining of known forms, whether bounded by right lines or curves. It is generally obferved on entering on the inveftigation of curvilinear delineation, that the perfpective reprefentation of a circle is a fection of the cone of rays, which, proceeding from the eye to all parts of the circumference of the circle, is made by a plane cutting them in any direction: that when the fection of rays is taken parallel to the bafe of the cone, the figure of the fection made is fimilar to the bafe whence the rays proceed, that is, a circle. When the fection is taken inclined to the bafe of rays, that then the figure made will be an oval [a]. And fo they proceed till they have enumerated every different way a cone may be cut, and particularized the forms that would thence be affumed, making reference to the fcience of conic fections, as if convinced their readers were well verfed in that ingenious and elaborate inquiry.

With equal propriety it might be faid of any rectilinear figure, whether right-angled or polygonal, that a fection of the pyramid of rays, formed by the eye viewing it, taken parallel to the bafe, will be a fimilar figure to the original, and that, taken in any other direction, would determine a figure confiderably different and diffimilar. All this, though very true, forwards the fubject nothing; and the ftudent, unlefs acquainted with thefe truths, muft rely folely on the affertion of his informer that it is fo. The fact is, the operative part of all perfpective delineation is by the interfection of right lines; that when right lines are to be obtained, by finding the extremes of them, the whole line is determined, and the reprefentation of a folid bounded by planes is, on that account, very foon accomplifhed: but this is not the confequence with refpect to the obtaining the reprefentations of curves; a ftraight ruler will in no way coincide with a curved line between its two extreme points. There is no mode of procedure for determining the apparent forms of curved lines, but by finding points in the curvature, and by obtaining fuch fufficient number of them, that the hand may be enabled to trace the curve through them with adequate correctnefs.

[a] Except in one pofition, and that is, when the cone of rays is cut by the plane of delineation fub-contrawife, as it is termed; that is, when the portion cut off is fimilar to the whole cone, then, of courfe, the bafes of both, being fimilar, muft be circular. But this takes place only in inclined cones.

[Plate 18.] When the curve is irregular, as the curve A B C D E F G (Fig. 1, Plate 18), a point muſt be aſſumed at every conſiderable variation in the curve, as at B, C, D, E, F, G, and ordinates be dropped from them to the baſe or chord of the curve A H, as B b, C c, D d, &c. the various heights of which ordinates being found, the curve may be traced through their top extreme points with very ſufficient correctneſs. Nor can any other mode be followed, let the curve be ever ſo regular; as a circle or an ellipſis. The only difference is, that the curve being regular, the points may be regularly aſſumed, and thereby be more eaſily found; but *however* regular the curve, it can be obtained only by finding points in its curvature. By circumſcribing and inſcribing a circle with a ſquare (as Fig. 2), eight points in its circumference may readily be obtained by ſimply finding the repreſentation of thoſe ſquares; and this, whether placed horizontally (as Fig. 3), or vertically (as Fig. 4), or inclined (as Fig. 5), and, with care, the curve may be traced through them. Eight points I conſider ſufficient for tracing the curvature of an oval, even of conſiderable magnitude; but if not thought ſo by others, more may eaſily be acquired. Points in the curvature of the repreſentation of an ellipſis, or oval, may alſo be obtained by circumſcribing and inſcribing it with rectangles, and finding thoſe rectangles, as Fig. 6: ſo of a hexagon or of an octagon, by circumſcribing them rectangularly, and drawing the regular parallel lines from one correſponding point to another, and delineating them merely, the required figure is likewiſe aſcertained by only drawing the boundary lines from the points ſo obtained (ſee Figs. 7 and 8). By finding the rectangular circumſcribing figures, and the parallel lines A B, C D, and E F, of the one, and C H, I K, L M, and N O of the other; the hexagon and octagon will be deſcribed by drawing their boundary lines from the interſecting points made by the lines of the right-angled figures before found, as C A, A D, E B, and B F, of the one, and the lines I L, N K, H O, and G M, of the other. Not but that ſuch figures may be more ſcientifically delineated by the aid of vaniſhing points, as will be ſhown by and by, but ſuch method as is now pointed out has conſiderable advantages.

EXAMPLE XII.

It is required to find the perſpective repreſentation of an irregular curved line, deſcribed on a plane ſtanding inclined to the plane of delineation.

The curve A B C D E F G H (Fig. 1, Plate 18) is the curved line; let it be inclined to the plane of delineation, I K, in the angle H I K; and let S be the ſtation point. The curve is ſuppoſed to ſtand upright on its chord or baſe A H.

Aſſume the points B, C, D, E, F, G, at the different variations of the curve, and draw the ſeveral ordinates B b, C c, D d, &c. perpendicular to the chord of the curve A H, and produce the chord line, or baſe of the curve, to I, for an interſection. Find the centre of the picture ⊙, and the vaniſhing point of the line A H, by the line S K being drawn parallel to it. [Plate 18.]

Prepare the picture (Fig. 9). Let X V be the horizon, and I L the ground line; I is the interſecting point, ⊙ the centre of the picture, and V is the vaniſhing point. Let the viſual lines through the points a, b, c, d, e, f, g, and h, correſponding with the viſual interſections at Fig. 1, be drawn.

Set up the ſeveral heights of the ordinates, Fig. 1, on the interſecting line I D, Fig. 9, at G, B, E, F, C, and D, and draw pencil lines from them to the vaniſhing point V, which croſſing the correſponding viſual lines, determine the points *B*, *C*, *D*, *E*, *F*, and *G*, through which the curve required may be traced with ſufficient accuracy.

EXAMPLE XIII.

It is required to find the repreſentation of a circle lying in an horizontal plane, and touching the plane of delineation.

Let the line M N (Fig. 10) be the length of a ſide of a ſquare circumſcribing the required circle; let ⊙ P be the horizontal line, and ⊙ the centre of the picture. The centre of the picture will be the vaniſhing point of the lines of the ſquare perpendicular to the picture, the other lines will be truly horizontal, therefore be drawn parallel to the horizon.

If the Student deſcribe a circle of diameter equal the ſide of the ſquare M N, and therein inſcribe a ſquare touching its circumference, he will find the length from a to c (on the line M N, Fig. 10) equal the length of the ſide of the inſcribed ſquare (as 86, Fig. 2), which length he will divide and ſet off equally on each ſide the middle point b; and which is in the figure ſet down for the completion of the example enjoined.

Make ⊙ P equal the diſtance of the picture, or plane of delineation, that is, equal the diſtance of the eye from the plane of delineation; P will then be the vaniſhing point of one of the diagonal lines of the ſquare, and a point on the horizon, equally diſtant on the other ſide of the centre of the picture ⊙, would be the vaniſhing point of the other diagonal line. To obtain eight points in the circumference of the required circle proceed as follows:

Draw the lines M ⊙ and N ⊙; then the diagonal line N P, cutting the line M ⊙ in the point R; draw the line R S parallel to the line M N, and the figure M R S N will be the repreſentation of the circumſcribing ſquare of the required circle. Draw the ſecond diagonal M S, interſecting the firſt in the

[Plate 18.] point g; through which point draw the lines b g d to ⊙, and e g f, parallel to M N, which will obtain the four points wherein the inſcribed circle will touch the ſides of the ſquare, b, e, d, and f. Let the inſcribed ſquare be now deſcribed to obtain four other points in the curvature of the circle. Draw the lines a ⊙ and c ⊙, cutting the diagonals in the points i, m, n, and o, which will be the four angles of the inſcribed ſquare, and four points of the circumference of the ſought circle; which may very correctly be drawn through the eight points b, i, e, m, d, n, f, and o, as is ſhown in the figure.

EXAMPLE XIV.

It is required to find the repreſentation of a circle in a vertical plane, perpendicular to the picture, the circle touching the plane of delineation.

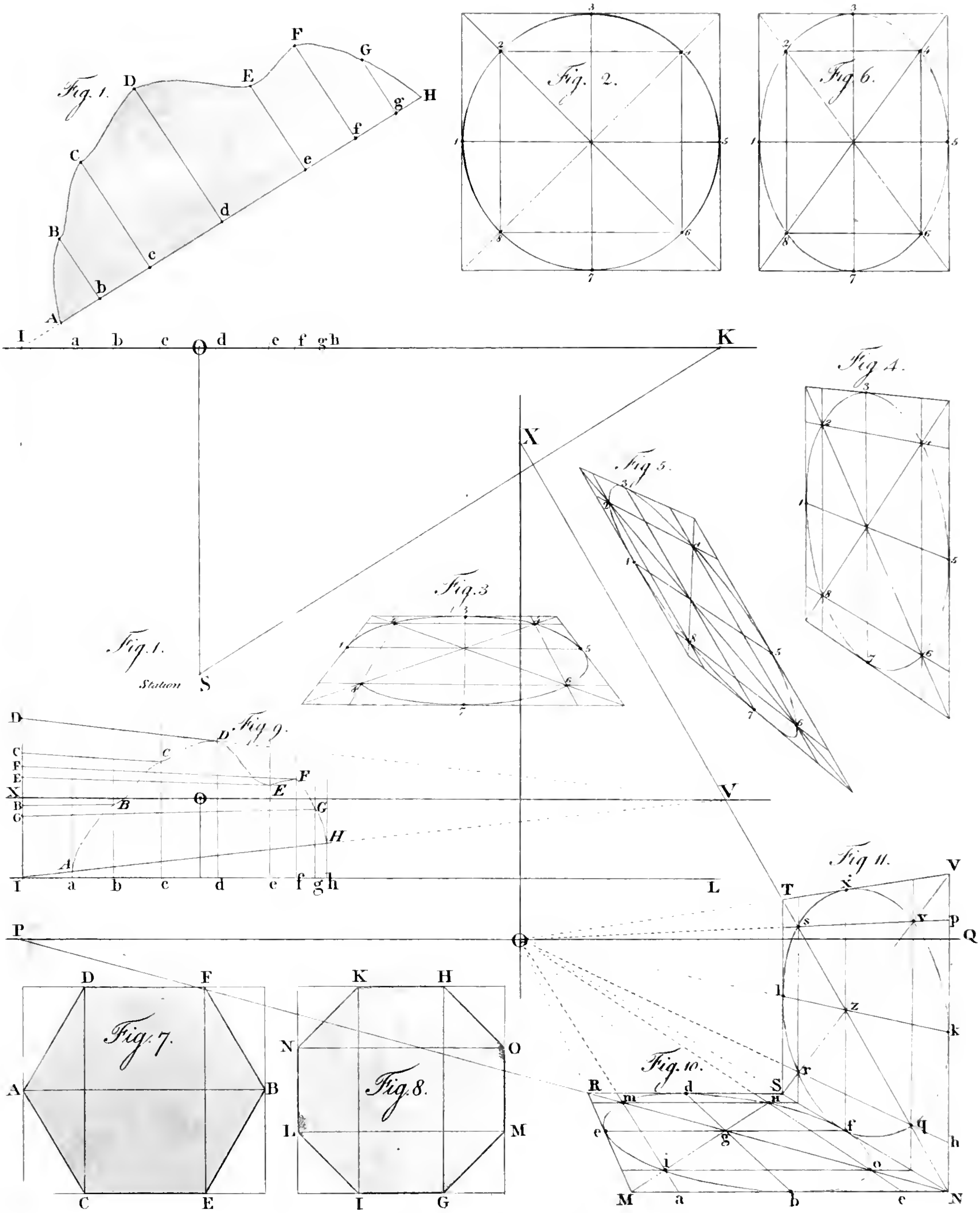
Let the line N V (Fig. 11) be the ſide of a ſquare circumſcribing the required circle; let P ⊙ Q be the horizontal line, and ⊙ the centre of the picture. The centre of the picture being the vaniſhing point of all lines perpendicular to the picture, will be the vaniſhing point of the top and bottom lines of the circumſcribing and inſcribed ſquares.

As was deſired in the laſt Example, if the Student deſcribe a ſquare within a circle of the required dimenſions, he will find it equal the length h p, ſet off equally on each ſide the middle point k.

Proceed as follows. Draw the vertical line ⊙ X, which line will be the vaniſhing line of the plane of the required circle (Def. 15). Make ⊙ X equal the diſtance of the picture (Def. 10), the point X will be the vaniſhing point of one of the diagonals of the ſquare circumſcribing the required circle.

Draw the lines V ⊙ and N ⊙; draw the diagonal N X, which, interſecting the line V ⊙ in the point T, determines V T for the ſide of the ſquare; and drawing the line T S parallel to V N, completes the circumſcribing ſquare. Draw the diagonal V S, interſecting the other in the point z, the centre of the required circle; through which point draw the lines l z k, and x z f, determining the four points in which the circle comes in contact with the external ſquare, the points f, x, l, and k. To obtain the internal ſquare draw the lines p ⊙ and h ⊙, which interſecting the diagonals of the circumſcribing ſquare, determine the four angles of the internal one, which are alſo four points in the circumference of the required circle; the points q, r, s, v. Eight points in the circumference are now obtained, viz. the points k, q, f, r, l, s, x, and v; through which the curve may be traced with very ſufficient accuracy.

The two laſt Examples conſidered unitedly, will ſerve to exemplify the doctrine of vaniſhing lines; and the truth and infallibility of the rules of perſpective delineation.



London Publ. by James Malton. August 1800.

When arches are in a vertical plane, and the plane of delineation placed parallel to the plane they are in, they muſt then be truly geometrically drawn on the picture, their decreaſed dimenſions, agreeably to their diſtance from the picture, muſt be obtained, which biſected, the arch muſt be ſtruck on that centre. But when they are drawn as ſituated in planes inclined to the plane of delineation, that is, when they are the repreſentations of original arches ſtanding inclined to the plane of delineation, then will they vary each from the other, agreeably to their place and diſtance, and in juſt relation thereto.

When arches are of equal magnitude, on the ſame level, and in the ſame plane, as are the arches of a long arcade, the trouble of finding their apparent curvature, when inclined to the picture, is but little, as the ſame heights of the ordinates that ſerve for the finding of one ſerve for all, were they ever ſo many.

EXAMPLE XV.

[Plate 19.]

Let the three equal arches, No. 1, *No.* 2, *and No.* 3 *(Fig.* 1, *Plate* 19), *ſtanding in a plane inclined to the plane of delineation,* I K, *in the angle* R I K, *be required to be delineated; and let* S *be the ſtation of the obſerver.*

When arches are not drawn to a large ſcale, three points found in their curvature between their extremes, or ſpringings, will be ſufficient to trace their curves through. In the arches here required to be drawn, let the points c, d, e, No. 1; h, i, k, No. 2; and n, o, p, No. 3; be the points of the ordinates, taken all equally diſtant from their centres. The viſual lines drawn from each of the ordinates, alſo from the extremes of the ſpan of each arch, to the ſtation S, will cut the plane of delineation in the points a, b, c, d, &c. Produce the plane of the arches to the plane of delineation for an interſection at I.

Let the three arches be ſuppoſed to be ſeen below the horizon, which let be equal the height I X, Fig. 2. The line X V will be the horizon, and I G will be the ground line. Set off the diſtances of the interſections of the viſual rays a, b, c, d, &c. Fig. 1, from the interſecting point I, on the ground line I G, Fig. 2, a, b, c, d, &c. and draw the viſual lines perpendicularly through them, and alſo a vertical line through the interſecting point I.

On the interſecting line I X, Fig. 2, ſet up the heights of the ordinates taken, of the required arches, that is, make I t, and I v, equal the ordinates c t, and d v, Fig. 1, and draw the lines I V, t V, and v V, Fig. 2, cutting the viſual lines of the ordinates, in the points 1, 2, 3, No. 1; 4, 5, 6, No. 2; 7, 8, 9, No. 3; through which points the curves may be drawn from the ſpringing of the arches with a ſteady hand with ſufficient accuracy.

[Plate 19.]

EXAMPLE XVI.

Suppoſe the arches of the laſt example were required to be drawn above the horizon, at any height at pleaſure, ſuppoſe at the height I N, *Fig.* 3; *the horizon and ſtation remaining as before.*

The ſtation and poſition of the arches being as before, the ſame viſual lines with the laſt, both in plan and elevation, will ſerve; it will only be neceſſary to heighten the viſual lines, Fig. 2, to Fig. 3.

Make N x and N z, Fig. 3, equal the heights of the ordinates c t, and d v, of the plan Fig. 1, and draw the lines N V, z V, and x V, cutting the viſual lines of the ordinates and ſpringings in the points o, o, o, o, o, &c. through which the curves may with care be traced.

Fig. 4, ſhows an arcade, ſtanding on piers, agreeably to the dimenſions and height of the arches of the laſt example.

Should the arches be unequal, as the arches of a bridge generally are, ſtill the ſame mode of drawing ordinates, and finding their heights according to their diſtance, muſt be purſued. The arches differing in dimenſions or in figure, that is, being either ſemicircular, ſegments of circles, or ſemi-ellipſes, will cauſe only a little more trouble in the operation of finding them.

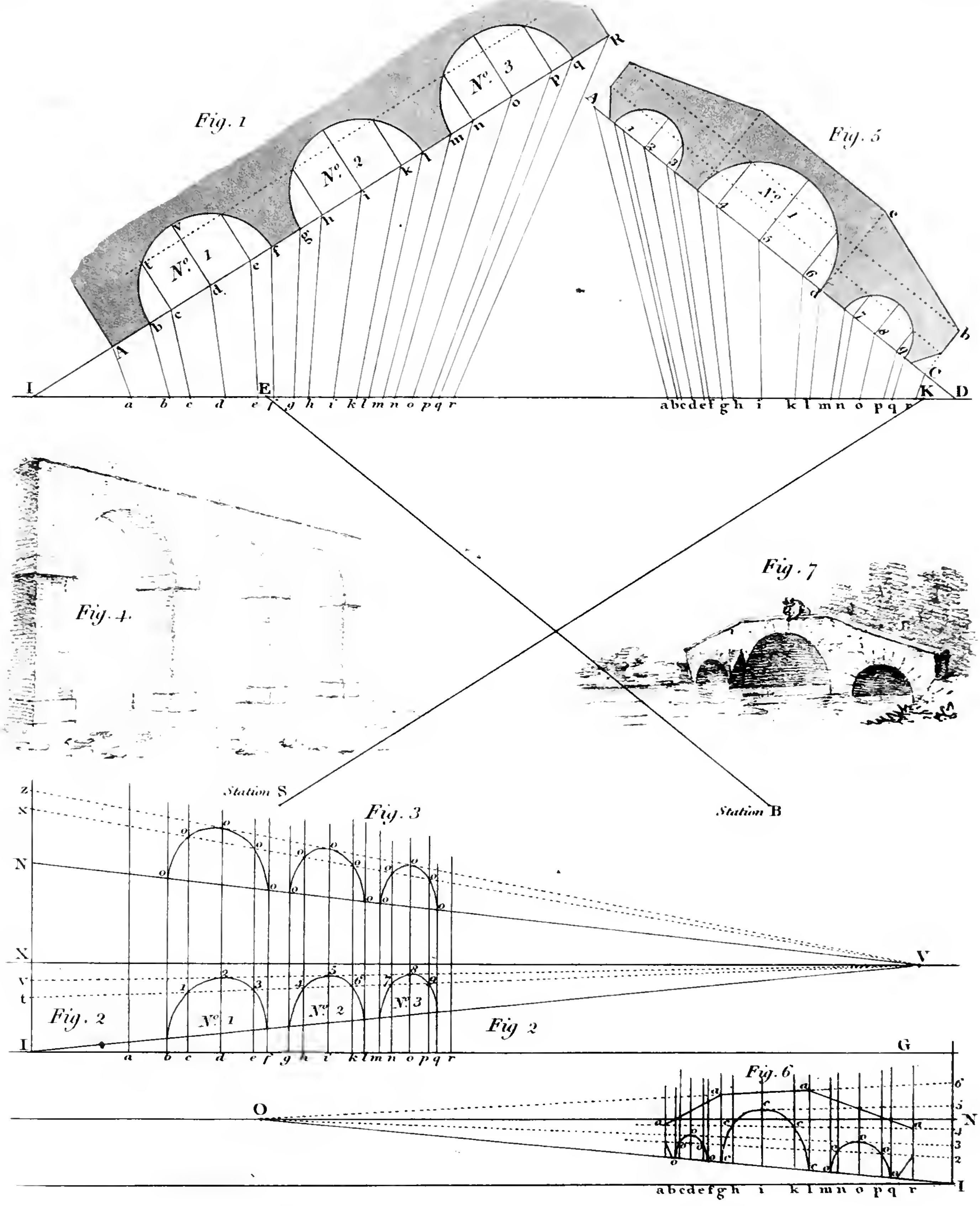
EXAMPLE XVII.

Let Fig. 5, be the geometrical elevation of a bridge. Let it be ſuppoſed to ſtand perpendicularly on the line A C; and let B be the ſtation whence it is viewed. Let I K be the ground line of the plane of delineation.

It is required to find the perſpective repreſentation of the above bridge, under the ſtated premiſes, ſuppoſing the horizon equal the height I N, *Fig.* 6.

Let the ordinates of the different arches be regularly aſſumed; and from their points of interſection, 1, 2, 3; 4, 5, 6; 7, 8, 9, on the chord line A C, let viſual rays be drawn to the ſtation B, as alſo from the piers or ſpringing of the arches, cutting the plane of delineation in the points a, b, c, d, e, &c.; and let the chord line A C be produced to D for an interſection. Draw the line B E, from the ſtation B, parallel to the chord of the arches, A C, for the vaniſhing point of horizontal lines in that direction.

Draw the horizontal line O N, Fig. 6, and parallel to it the ground line through the point I. Make N O equal the diſtance D E, Fig. 5, and ſet off the diſtances of all the viſual rays, D a, D b, D c, &c. Fig. 5; at I a, I b, I c, &c. Fig. 6, and draw the viſual lines through them.



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First, to obtain the points in the curvature of the two ſmall arches, which [Plate 19.] being of a ſize, and their ordinates of equal height, the operation of finding the heights of the perſpective ordinates will ſerve for both, as was ſhown in the laſt example. Make the heights I 2, I 3, on the interſecting line I N, Fig. 6, equal the heights of the ordinates of the ſmall arches, Fig. 5, and draw the lines 3 O, 2 O, and I O, cutting the viſual lines of the arches in the points o, o, o, o, o, and o, o, o, o, o; through which points the curve may be traced, as is there done[a]. On the interſection, Fig. 6, make I 4, and I 5, equal the heights of the ordinates of the centre arch No. 1, Fig. 5; and draw the lines 5 O and 4 O, cutting the viſual lines of the centre arch in the points c, c, c, c, c; through which the curve may readily be drawn. I 4 and I 6 are equal the heights of the coping of the bridge C b and d e, Fig. 5; from which points, if lines be drawn to their vaniſhing point O, the proper viſual lines will be interſected, as in the figure, in the points *a*, *a*, *a*, *a*; joining which points, by right lines, completes the entire of the bridge, and, cleared of its operative lines, and ſhaded, would be as Fig. 7.

Thus, by finding of points in the curvature of regular or irregular lines, are their apparent forms obtainable, nor can there be any other method deviſed, by which that end can be effected.

EXAMPLE XVIII. [Plate 20.]

Let it be required to find the apparent form of a circular ſtructure, part cylindrical, part conical, in the ſhape of a potter's kiln. Fig. 1, Plate 20, is the geometrical elevation of the given ſtructure; its baſe, A B C D, cylindrical; its ſuperſtructure, B E F C, conical. The circle a a a a, &c. Fig. 3, is the plan of the baſe, and the ſmall concentric circle 4 4 4 4, &c. the dimenſions of the circle of the top of the conical part, at E F, Fig. 1.

It is required to find the apparent form of ſuch a figure, from the ſtation S, *the plane of delineation being at* V Z, *and the height of the horizon being equal the height* A G, *Fig.* 1.

Circumſcribe and inſcribe the two circles of the plan Fig. 3, by ſquares, and draw viſual rays from the angles of thoſe ſquares to the plane of delineation. Produce the diagonal of the ſquares M K to I for an interſection, and draw a line from the ſtation parallel to the diagonal, to obtain its vaniſhing point, which will be diſtant from the centre of the picture ⊙, equal the diſtance S ⊙.

[a] The Student is adviſed to practiſe this Example to a much larger ſcale.

[Plate 20.] A line from the ſtation S, drawn to the picture, parallel to the diagonal of the plan, would not come within the limits of the plate; half the diſtance is therefore taken, at s, and the line s Z drawn. ⊙ Z will then be half the diſtance of the vaniſhing point, that is, ⊙ Z will be equal ⊙ s, or half ⊙ S.

Firſt, to the delineation of the cylindrical baſe. The two circles of the top and bottom being equal and parallel, 'tis only requiſite to find them, and being joined together by the external vertical lines, tangents[a] to them both, the whole figure is completed, as is ſhown, Fig. 5.

Prepare the picture, Fig. 4. The line KK is the horizon, and LM the ground line, diſtant from each other equal the height AG, Fig. 1. From the centre of the picture ⊙, ſet off the diſtances of the ſeveral interſections of the viſual lines from the plan Fig. 3, as alſo the interſecting point of the diagonal, I, at the correſponding letters b, c, e, and f, and L, Fig. 4. Draw the interſecting line LP, and the viſual lines of the ſquares through the points b, c, e, and f, and make ⊙ d on the horizon equal the diſtance of the vaniſhing point of the diagonal, that is equal twice ⊙ Z, Fig. 3.

On the interſecting line Fig. 4, ſet up LE, equal the height of the cylindrical baſe of the object AB, Fig. 1; and draw the lines Ed and Ld cutting the viſual line of the exterior angle of the ſquare in the points m and n, and draw the horizontal lines m o and n p, to the viſual line through the oppoſite angle of the ſquare. Then draw the lines m⊙, n⊙, o⊙, and p⊙, and v w and r t, completing the circumſcribing ſquares of the top and bottom circles. Draw the other diagonals, VO and r p, which, interſecting, determines the centres of each of the circles, through which centres, diameters being drawn to the middle of the ſides of the ſquares, the four points are obtained wherein the inſcribed circle touches the ſides of the ſquare.

The diagonal lines Ed and Ld alſo cut the viſual line of the angle of the inſcribed ſquare in the point 2; and drawing the line 2 3, and the lines 2 4, and 3 5, to ⊙, the internal ſquare 2 4 5 3 is determined, and four other points in the curvature of the required circle are obtained; through which eight points the curve may very well be drawn. The ſame is to be done of the circle above the horizon, but it being ſo contracted in its appearance, from its nearneſs to the horizon, the proceſs of obtaining it can better be traced from inſpection of the figure, than by deſcription. Draw the vertical lines *a b* and *c d*, tangents to the above curves, and the baſe of the figure will be completed; the extent of which will be found to be exactly the ſame with the ſquare comprehended

[a] A Tangent to a circle, or other curve, is a right line which juſt touches the curve, and of courſe in nowiſe coincides with it, but the curve quits it immediately on each ſide.

between the points of interfection x and z, Fig. 3, where vifual rays from [Plate 20.] the ftation are tangents to the cylindrical bafe of the object.

To obtain the circle of the top of the object, draw the diagonal line Pd, firft making the height L P, on the interfection, equal the height T R, Fig. 1.

The fhort lines *e*, *f*, *g*, and *h*, are the vifual lines anfwering to the vifual interfections *o*, *o*, *o*, *o*, (Fig. 3,) of the two fquares circumfcribing and infcribing the circle of the top, which interfections are fet off from the centre point B, the ray of the dotted vifual line in the middle of the object Fig. 4. Where the line *e* interfects the diagonal line Pd, draw the horizontal line *e*, *h*, and the lines *e* ⊙, and *h* ⊙, to their vanifhing point ⊙. Where the line *h* ⊙ interfects the diagonal line at *i*, draw the horizontal line *i k*, and the circumfcribing fquare *e h i k* will be completed. Draw the other diagonal line of the fquare, and through the centre of the fquare draw the lines o o, and o o, determining four points of the curve of the circle. The inner fquare is obtained in like manner with the foregoing, from the lines f, and g, by which four other points are had in the curvature, 3, 3, 3, 3; through which eight points the circle may eafily be traced. The circle of the top, and the circle of the bafe, being joined by the tangent lines *o b*, and *o d*, the whole required figure is completed.

EXAMPLE XIX.

Let it be required to find the reprefentation of a circular object, of which let Fig. 2 be the geometrical elevation. The bafe A B C D is the fame as the bafe of the former object, but the fuperftructure is fomewhat different, as well as more complicated; the conical part being the form H I K L. The circular plan, Fig. 3, is as well the plan of the prefent as of the former object, with the addition of two circles expreffing the dimenfions of the ftructure at H L and I K. The circle of the gallery is the fame, in diameter, as that at H L, and the top the fame with E F of the former object.

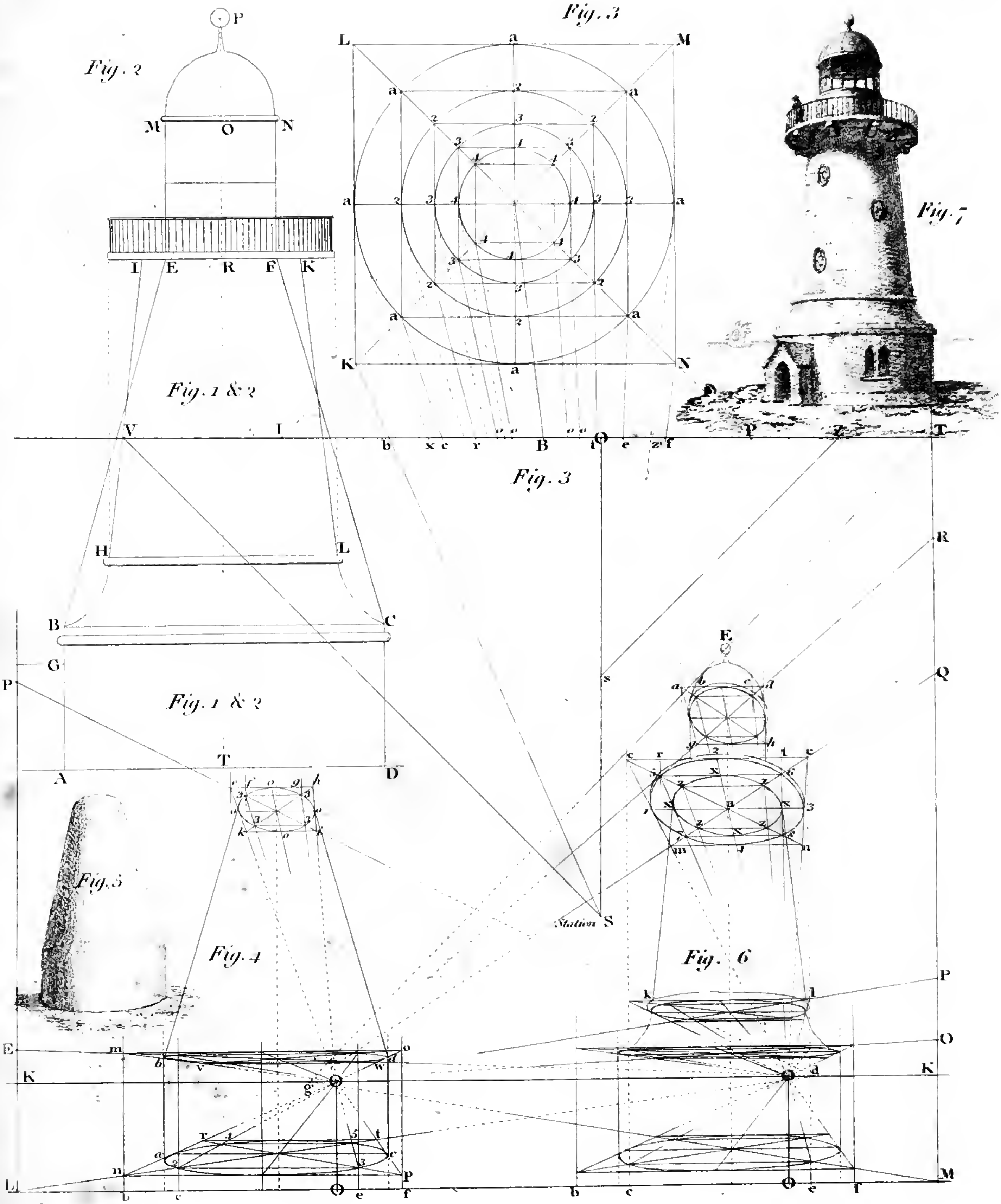
It is required to find the perfpective of the above object, Fig. 3 being the plan and fituation with the plane of delineation V Z, *and* S *is the ftation.*

Let each circle of the plan, Fig. 3, be infcribed and circumfcribed by a fquare; and from the angles of thofe fquares, let vifual rays be drawn to the plane of delineation, and let the general diagonal, L N, be produced to P for an interfection with the picture.

Let L M, Fig. 6, be the ground line of the picture, and let K K be the horizon. ⊙ is the centre of the picture, and g, on the horizon, is the vanifhing point of the diagonal line, ⊙ g being equal the diftance ⊙ V, Fig. 3.

[Plate 20.] The visual lines through the points b, c, e, and f, Fig. 6, are the visual lines from the near angles of the two squares of the great circle of the base of the object. The height M O, on the intersection, is the height of the base of the object, equal the height D C, Fig. 2. The base of the present example being exactly the same with that of the former, it is needless to go through the process of obtaining it; the practice of the preceding, and inspection alone of this, will be ample information as to its attainment. M P, on the intersection, is the height of the circle H L, Fig. 2. The line P g being drawn, intersects the visual line of the angle of the square, determining the point l of one of the near angles of that circumscribing square; from which point the whole may be readily completed; but which process being the same with the finding the circle of the gallery above, we will proceed to the description of it, as, being more discernible, it will better answer the purposes of both.

Draw up the visual lines c c, and e e, the visual lines of the two near angles of the square circumscribing the required circle. Make M Q, on the intersection, equal the height of the gallery T R, Fig. 2, and draw the diagonal line Q g intersecting the visual line e e, in the point e, answering to the point l of the square below. Draw the horizontal line of the square c e, and from the points c and e draw lines to ⊙, the vanishing point of lines perpendicular to the picture. The line from the point c intersects the diagonal in the point m, from which draw the line m n, parallel to c e, completing the square e c m n; in which, draw the other diagonal c n determining the centre of the circle a. Through the centre, a, let two lines be drawn through the square, one parallel to c e, and the other in direction to the vanishing point ⊙, which will obtain four points, 1, 2, 3, 4, in the circumference of the circle. The short lines r and t, answer to the visual lines of the near angles of the inscribed square, agreeable to the visual intersections r and t, Fig. 3. Those lines intersect the diagonals in the points 5 and 6, from which, lines being drawn in direction to ⊙ determine the two other angles of the square, and points in the circle, 7 and 8; through which eight points let the circle of the gallery be drawn. The square 5 6 7 8, is the exterior square of the circle of the body of the object at top, in which, four points are already determined, x, x, x, x; and the four other points, z, z, z, z, are readily obtained from the visual intersections o o of that square in the plan Fig. 3, and the circle drawn through them; draw the lines of the conical body of the object x k and x l. There only remains to find the top circle at M N, Fig. 2.



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Make M R, on the interfection, equal the height T O, Fig. 2. and draw the [Plate 20.] diagonal line R g, which cutting the contiguous vifual line *d*, determines the point *d*, one of the angles of the outer fquare; from which point, the fquare *d a g b* is obtained. The vifual lines *a*, *b*, *c*, *d*, anfwer to the vifual interfections o, o, o, o, from the angles of the correfponding fquare in the plan Fig. 3. The procefs of obtaining the inner circle being the fame with either of the preceding cafes, the mere infpection of the figure will fuffice as to the procefs, and convey very ample information. The height M T, on the interfection, Fig. 6, is the height of the centre of the ball, equal the height T P, Fig. 2; and the line T g being drawn, where it cuts the dotted line through the middle of the object, at E, is the place of the centre of the ball in the reprefentation. Thus is the whole that is neceffary to be obtained ftrictly by rule accomplifhed; the other lines and additions to the general figure are eafily fupplied by the hand and judgment. It would be perfectly irkfome to obtain every minutia by rule; the leading figure and features being found, if the judgment cannot trace the reft, little will be done by fuch a hand.

The required lines being drawn in ink, and the operative lines rubbed out, the object will remain difencumbered, which fhaded, may be, as Fig. 7, not unlike the light-houfe on the pier at Ramfgate, whence the idea was taken.

The mode that has been adopted to find the perfpective of a circle, by obtaining eight points, regularly affumed, in its circumference, would as well have obtained the reprefentation of an octagon, if, in place of tracing a curve through each two points fo as it fhould fall in a flowing unbroken line through the fucceeding, they had been joined together by right lines, chords to thofe fame curves; as is fhown geometrically Fig. 1, Plate 21, and perfpectively in [Plate 21.] Fig. 2. But a ftill more fimple method would be as before recommended and fhown, Fig. 8, Plate 18, by drawing and finding the parallel lines from the extremes of the oppofite fides; which we will now put in practice.

EXAMPLE XX.

Figure 3, Plate 21, is an octagon, around which, let a fquare I K L M be defcribed; let the parallel lines C F, B G, and A D and H E, be drawn.

It is required to find the perfpective appearance of the above octagon, by finding the circumfcribing fquare, and the parallel lines within, from a given ftation and point of view.

Let the line V X be the place of the plane of delineation parallel to a fide of the fquare. Let S be the ftation. The centre of the picture ⊙ will be the va-

[Plate 21.] niſhing point of the lines perpendicular to the picture; and the diſtance of the picture S ⊙, laid down on the horizon, on each ſide the centre ⊙, will give the vaniſhing points of the diagonals of the ſquare. Draw the viſual rays in direction to the ſtation cutting the plane of delineation in the points k, c, b, i, a, h, m, and produce the diagonal K M to N for an interſection.

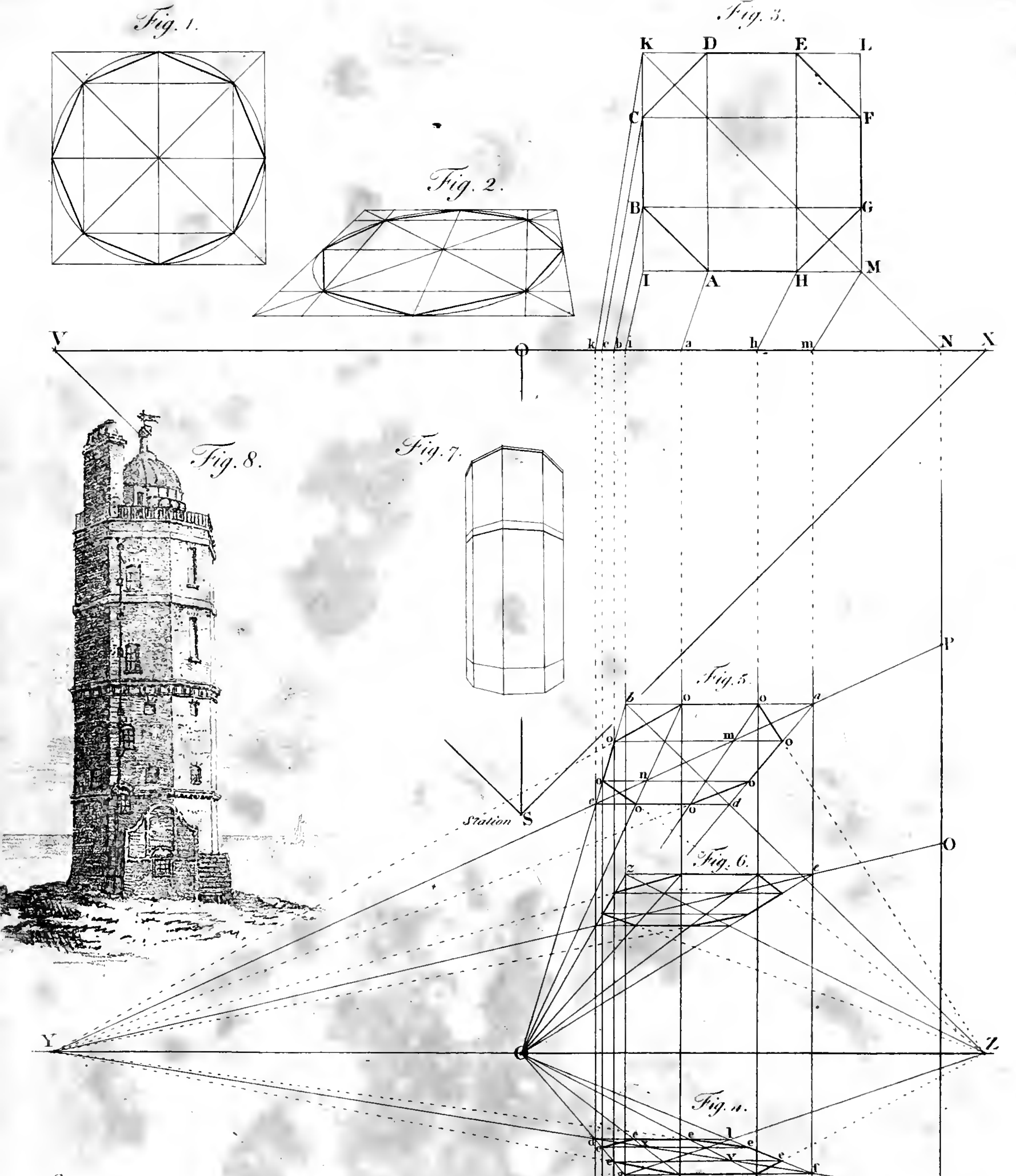
Prepare the picture, Fig. 4, by drawing the ground line G L, and parallel to it, the horizon, Y Z. ⊙ is the centre of the picture, and ⊙ Y and ⊙ Z are each equal the diſtance of the picture S ⊙ in the plan, wherefore Y and Z are the vaniſhing points of the diagonals of the ſquare, and of all lines parallel to them. The viſual lines through the points k, c, b, i, a, h, and m, anſwer to the correſponding viſual interſections in the plan. L, in the interſecting point, and L N, the interſecting line. We will firſt obtain the repreſentation of the octagon as lying in the ground plane.

Draw the diagonal line L Y, from the interſecting to the vaniſhing point. The point f, where it cuts the viſual line through the point m, is the place of the near horizontal ſide of the ſquare, f g. Draw the lines g ⊙, f ⊙, and d l, which will complete the ſquare f g d l, of which, the line d f is a diagonal. From the points e and e, where the viſual lines through the points a and h touch the near ſide of the ſquare, draw the lines e ⊙, and e ⊙, croſſing the oppoſite ſide of the ſquare in the points e and e; and where they croſs the diagonal d f in the points v and x, let horizontal lines be drawn through thoſe points to the oppoſite ſides of the ſquare, cutting them in the points e, e, e, e; and drawing the corner lines e e, e e, &c. the octagon e, e, e, e, e, e, e, e, is completed.

Let it be required to find the appearance of the ſame octagon, as ſeen elevated above the horizon, directly over the one found on the ground plane; ſuppoſe equal the height L P *on the interſection.*

Draw the viſual lines of the ground figure up to Fig. 5. Where the diagonal line P Y croſſes the near viſual line in the point *a* is the place of the near ſide of the ſquare around the octagon, and the horizontal line *a b* is that ſide. Draw the lines *b* ⊙, *a* ⊙, and *c d*, completing the ſquare *a b c d*. Where the viſual lines, through the points a and h below, croſs the ſide of the ſquare *a b*, at o, o, let lines be drawn to the centre, ⊙, croſſing the oppoſite ſide of the ſquare *c d*, in the points o o; and where they croſs the diagonal line in the points m and n, let horizontal lines be drawn through thoſe points to the other ſides of the ſquare, cutting them in the points o, o, and o, o; the remaining ſides of the octagon at the corners being joined together, the whole octagon o, o, o, o, o, o, o, o, is completed, as required.

PLATE 11



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Thus, at whatever height required, the procefs of finding the figure is with facility performed: as fuppofe at the height LO, on the interfection; the diagonal line OY being drawn, cuts the near vifual line, Fig. 6, in the point *c*, whence is drawn the fide of the fquare *c z*; from which the whole may be completed by the fame procefs as before fhown in Figures 4 and 5. [Plate 21.]

The diagonal vanifhing points Y and Z are as well the vanifhing points of the corner fides of the octagon, as of the diagonals of the fquare; for thofe fides of the octagon are parallel to the diagonals (fee the plan, Fig. 3); they will therefore have the fame vanifhing points. In the figures juft obtained, if a ruler be applied to thofe lines, they will be found to tend correctly to their feveral vanifhing points; to which they are continued, in the figures, by dotted lines agreeably to their direction. Thus will the ufe of thofe vanifhing points contribute to the correctly delineating the figure, and at the fame time illuftrate the truth and beauty of the rules of perfpective.

Joining the correfponding points of the octagons, above and below, by perpendicular lines, a folid figure will be formed, like to Fig. 7, or like to Fig. 8; where the rules, but juft performed, are exemplified in an appropriate figure, and which is a view of the light-houfe on the North Foreland near Margate.

Thus by a very fimple method may, apparently complicated figures be obtained, with the utmoft correctnefs and facility. Thus may a hexagon be defcribed (fee Fig. 7, Plate 18), and fo of any other regular polygon.

I will give one more example of general figures, more complicated than any that has hitherto been defcribed; and after performing it, will proceed to give fome general rules, governing the procefs of taking views, whether of fingle or many objects. This fhall clofe the firft divifion of my fubject, which fhall be refumed again with an inquiry into many interefting particulars and minutiæ, whereby a more intimate knowledge cannot fail of being obtained.

EXAMPLE XXI. [Plate 22.]

Let Figure 1, Plate 22, be the general plan of a church, which, like moft country churches, let be compofed of feveral parts. Let A B C D be its body; E F G H its tower; I K L M, and M L N O, be fubordinate parts of the building; and let a b c d be the porch. Let Fig. 2, be its geometrical elevation; the ends and meafurements *A B* and *B C*, anfwering to I M and M O in the plan Fig. 1; and the points of the roofs *D*, *E*, and *F*, Fig. 2, anfwering to the lines of the ridges Q R, T V, and P L, Fig. 1.

Q

[Plate 22.] *It is required to find the perspective representation of the above building, on the plane of delineation* Y Z, *the station being at* S.

Find the vanishing points Y and Z, of the horizontal lines of the building by the lines S Y and S Z being drawn from the station parallel to them. ⊙ is the centre of the picture. Draw the visual rays from the visible angles of the object, in direction to the station S, till they intersect the plane of delineation.

When a complicated object is to be drawn, that is, when it is composed of many parts, it necessarily gives rise to a number of visual rays for the precise determination of those parts, and the whole together will form an apparently confused number of lines. But the eye that views them properly sees no confusion in them; it views them as the eye of the astronomer views the starry hemisphere, placing each cluster, and arranging each straggling brilliant in its proper sign.

To avoid confusion of rays in a very complicated object, it is advisable to use different coloured inks in the classing of the rays, as also different degrees of strength of those colours to particularize different parts.

In the delineation of such an object as the present example, the first consideration is the choice of a proper intersection; for although any intersection will do, one should be chosen, which should unite most parts in its direction, with the greatest exactness and least trouble. In the present instance, none seems so eligible as the direction of the roof P L M, which let be produced to W.

In the picture, Fig. 3, G L is the ground line; let G V be the height of the horizon, the line V X will then be the horizontal line. ⊙, in the horizon, is the centre of the picture, from which, place the distances of the horizontal vanishing points ⊙V, and ⊙X, equal the distances ⊙Y and ⊙Z, Fig. 1. A B, Fig. 3, is the intersecting line, and all the visual lines on the plane of delineation are drawn agreeably to their intersections on the ground line in the plan.

On the intersecting line, the height A C is made equal the height *AG* of the elevation, Fig. 2; and the lines C c and A a being drawn in direction to the vanishing point V, determine the height a c, the height of that part of the building on the visual line answering to the ray from the point M in the plan Fig. 1. Through the points a and c draw the lines d e and b f to their vanishing point X, determining the plane b d e f, the representation of the plane *AGHC*, Fig. 2; the visual lines b d and f e answering to the rays from the points I and O, in the plan. Draw the lines d h and b g tending to their vanishing point V, to the ray from K in the plan, completing the plane b g h d. On the intersection, make the height A D, equal the height of the roof *NE* of the elevation Fig. 2, and draw D i in direction to V; through i draw the line k l, to the vanishing point X, touching the visual lines of the roofs in the

points k and l; draw the lines k m, m h, k d, k c, l c, and l e, which will [Plate 22.] complete the whole of the ſtructure over the plan I K N O, Fig. 1.

The height of the roofs of the low buildings is equal the height of the upright walls of the body of the ſtructure, as is ſhown by the line *P R*, in the elevation Fig. 2; wherefore, the line m o, and the return line o n, may be drawn to the viſual lines correſponding with the interſections from the angles A and B of the plan. Alſo, from the angle g, the line g s may be drawn, which will determine the lines s r, r t, and t p, of the porch. Make A E, on the interſection, equal the height of the roof *B F* in the elevation, and draw the line E V, determining the ridge of the roof between the two viſual lines from the points P and L of the plan. Draw the lines of the gable end v o and v z; the point z is obtained by the line o m being drawn to its vaniſhing point X, cutting the viſual line from the angle D of the plan, in the point z.

Make A G and A F, on the interſection, equal the heights of the tower, *B O*, and *B M*, of the elevation, and draw the lines G V and F V, cutting the viſual line from P in the plan, in the points *a* and *b*; through which points draw the lines *a c* and *e f*, to their vaniſhing point X; and the lines *c d* and *c g*, to their vaniſhing point V; the points *g*, *e*, and *f*, being in the proper viſual lines from the angles of the tower F, E, and H, in the plan. Complete the tower by drawing the lines *d g*, *d e*, *a e*, and *a f*.

The preſent example was contrived to elucidate the general practice of vaniſhing points, which are as well to be obtained of other poſitions of lines, as horizontal ones. It is not always that the vaniſhing points of inclined lines are required, but they are often uſeful, and ſometimes abſolutely neceſſary. In the geometrical elevation, Fig. 2, the lines *M O*, *P F*, *G D*, *I E*, are all parallel lines, as alſo are the lines *O V*, *F R*, *E H*, and *D I*; and though ſituated in different, yet they are in parallel planes, and will therefore have a common vaniſhing point. A line drawn perpendicularly to the horizon through the vaniſhing point X (Fig. 3), as L Q, will be the vaniſhing line of the plane of the end of the church over the line I O of the plan, alſo of the end of the body A D, likewiſe of the ſide of the tower E H. And a line drawn through the point V (Fig. 3), perpendicularly to the horizon, as G M, will be the vaniſhing line of the planes over the lines (Fig. 1), I K, A B, a b of the porch, and F E of the tower; and all lines in thoſe planes, or the boundaries of thoſe planes, will have their vaniſhing points ſomewhere in thoſe vaniſhing lines [a].

To obtain the vaniſhing points of the inclined lines of the roofs and tower,

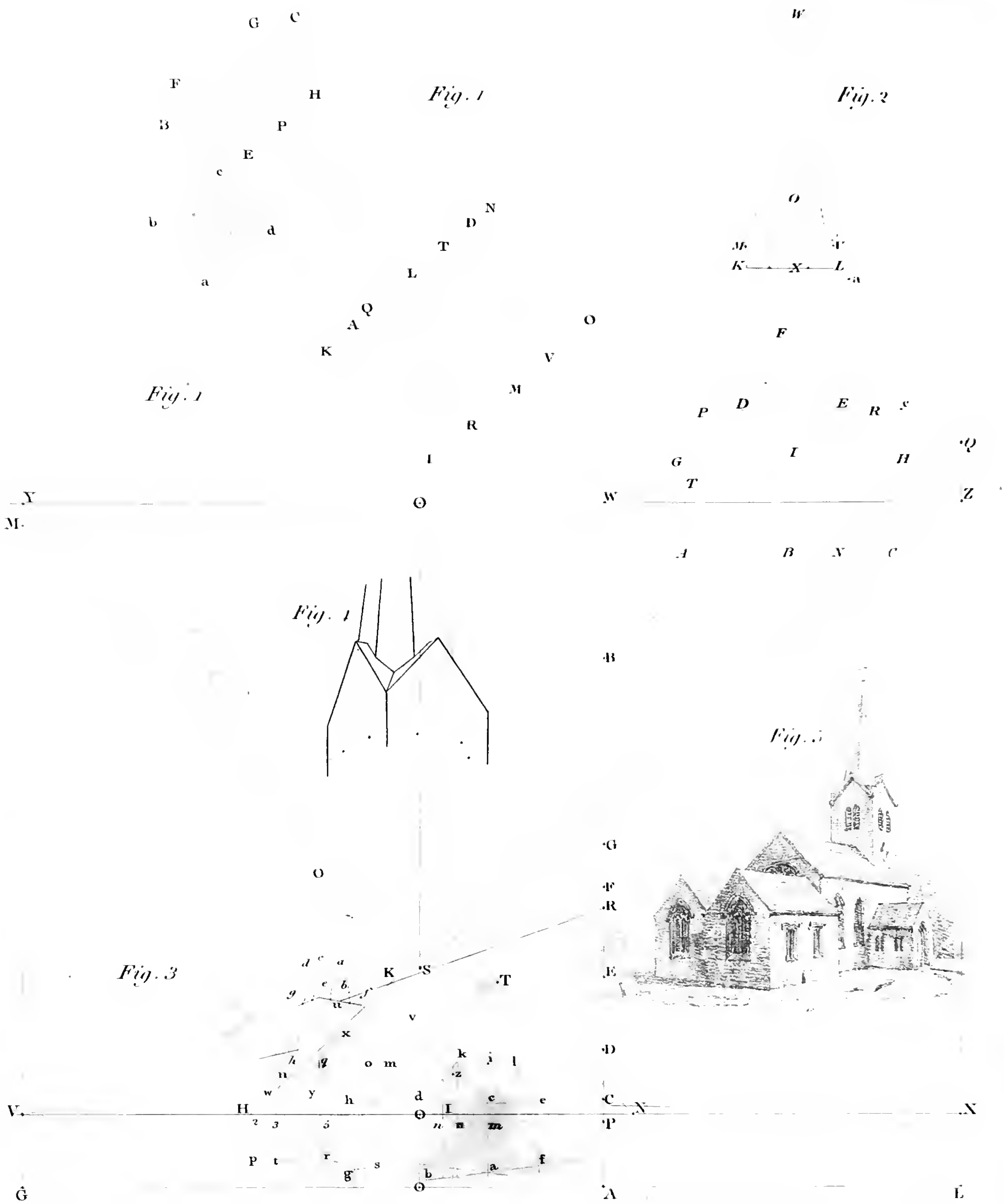
[a] This circumſtance of finding the vaniſhing points of inclined lines was before treated on in Example 8, Fig. 5, Plate 15; but here it is more fully exemplified.

[Plate 22.] proceed as follows: take the diſtance of the vaniſhing point Z, from the ſtation S, in the compaſſes; that is, take the length of the line S Z, and apply it on the horizon from X to H. At the point H make an angle with the horizontal line, equal the angle of the roofs a *P* c, Fig. 2; the curve K I, and the diſtance of it from the centre H, being equal to the curve ac, and diſtance of it from its centre *P*; then is the angle K H I equal the angle of the roof a *P* c, Fig. 2. Produce the line H K to Q; Q will be the vaniſhing point of the line *e a* of the tower, alſo of the parallel lines o v, d k, and c i; which, though obtained by a different proceſs, will all be found, by application of a ruler, to tend truly to that point, as is ſhown by the dotted lines in the example.

A like proceſs being performed of the diſtance of the vaniſhing point Y, from the ſtation S, will obtain the vaniſhing point of the ſame inclination of lines in the other planes of the object. Take the length S Y in the compaſſes, and ſet it off on the horizon, from V to N. At the point N, make an angle I N T, on the horizon, equal the angle K H I, that is, equal the angle of inclination of the roof, a *P* c, Fig. 2. The line N T produced to M in the vaniſhing line G M, will be the vaniſhing point of the line *de* of the top of the tower, alſo of the lines w 3, and y 5, of the porch (the inclination of the roof of the porch being the ſame as the other roofs of the body of the church), as is ſhown by the dotted lines in the example. The walls of the porch are obtained from the height A P, on the interſection, equal the height *A T*, Fig. 2. P *m* being drawn to the vaniſhing point V, and *m n* to X gives the lines n 5, 5 3, and 3 2.

It muſt be obſerved that the inclined lines *a f*, l e, k c, and v z, have a common vaniſhing point, obtainable if required; and which vaniſhing point will be in the ſame vaniſhing line with the point Q, and as much below the horizontal vaniſhing point X, as the point Q is above it; to which point, were it obtained, thoſe lines, already drawn, will be found exactly to tend. It is ſeldom abſolutely neceſſary to have both thoſe points; in the preſent inſtance one of them only, the point Q, is obtained, which would anſwer every end required of both; for ſuppoſing it were left to that vaniſhing point for the finding the inclined lines, the viſual lines being drawn, and the heights of the upright walls being found, the line d k drawn in direction to the vaniſhing point Q, determines one ſide of the gable-end at the viſual line in the middle; the other is accompliſhed by joining the points k and c together. So of the other gable, c l being drawn, l e is alſo had by joining the points l and e together.

To complete the whole, draw the line *x q*, on the tower, from the point x, to the angle of the tower, in direction to the vaniſhing point Q; then



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draw the lines *qb*, and n*b*, to their proper vifual lines, and vanifhing points V and Q. The putting on of the fpire is a work of fome confideration, and muft be proceeded on with thought and care. The bafe of the fpire is intended to be a regular octagon. If the two external lines in the geometrical of the fpire, be continued till they touch the fides of the tower, as is done at *K* and *L* (Fig. 2), and an octagon be there conftructed, extending the fquare of the tower, it will be the bafe of the fpire. Set up the height of the fpire *B W*, Fig. 2, on the interfection, Fig. 3, at B; alfo the height of the bafe line *K L*, at R; and draw the lines B V and R V; the firft, cutting the vifual line through the centre of the tower in the point O, determines the height of the fpire; the other, cutting the tower in the point u, determines its bafe. Through the point u draw a line around the tower, and find the points of the octagon in the middle of each face of the tower, to which let lines be drawn from the top O, and the fpire and whole object will be completed, as is fhown in the Example. [Plate 22.]

I have now gone through the procefs of finding the above complicated object. I had expectations of performing it with lefs confufion of lines than the refult has made neceffary; but one thing fucceeding another, and each neceffitated to remain, for the obfervance of the ftudent, the whole together unavoidably becomes intricate. Nor is it now fo entirely performed, but that fomething remains for the ftudent to complete, but which would take more words to make clear, than the defcription of the whole has done. What I allude to is, the interfections that take place at the lodgment of the fpire on the top of the tower, which, for clearer obfervance, is drawn to a larger fcale at Fig. 4; the mere infpection of that figure will ferve to convey a full, and I hope fatisfactory, idea of what I allude to. The Student has alfo been left to complete the bafe of the octagon, which, no doubt, he is well enabled to do, or he has gone through the work to little purpofe. As before obferved, it is next to an impoffibility to give fuch thorough explanation in intricate matters as to leave nothing for the Student to exercife his own judgment on; however copious his inftructor may be, there will always fufficient remain undone to keep alive the active powers of his pupil, and give him opportunity of exerting his own ingenuity. That fcholar muft not fleep who would inftruct himfelf in fcience from book alone.

Fig. 5 is a picturefque reprefentation of the object juft performed, which is the form of a church very commonly met with in the country.

Having, by the exercife of the foregoing examples, advanced the Student to fome tolerable knowledge of the practice of perfpective drawing, I will now

enter into an inquiry of a very important confideration. Methodically proceeding, it fhould have been antecedent to any practice; it is, however, fometimes expedient to do that firft, which in juft progreffion fhould follow; as it is not until fome infight is had into a fubject that the neceffity of certain inquiries becomes evident.

It has been matter of much difference of opinion, the adjufting what may generally be confidered the beft angle of vifion, within which objects fhould be regarded to obtain the moft agreeable reprefentation of them. For, accordingly as the angle of vifion is enlarged or leffened, by viewing the objects near or remote, will their appearance vary, and their delineation in confequence be affected thereby.

[Plate 23.] By the angle of vifion, or angle of view, is to be underftood, the expanfion of the lines, proceeding from the eye, by the two extreme vifual rays embracing the whole extent of the view; and this, whether it confift of one object or of many. This can clearly be explained only by reference to fome figure. (Fig. 1, Plate 23.) Let A reprefent the plan of a manfion; let B be the fituation of an outhoufe contiguous to the manfion; and let the places of trees be intimated by the fpots C, C, C, and D, D, D. Let S be the ftation or point of view whence the whole is regarded. Confidering the manfion A, as a lone object, the extreme vifual rays S a, S b, form at the eye, the angle a S b; then is the angle a S b the angle of view under which that object is feen, S a and S b being the two extreme vifual rays embracing the whole extent of the object. Again, if the outhoufe B be confidered as a lone object, then will the extreme vifual rays, c S and d S, form, at the eye, the angle c S d, being the magnitude of the angle under which that object is feen. And fo of any object, the vifual rays that embrace its whole extent, form the angle of view under which it is faid to be feen. It muft be manifeft then, that this angle of view will be large or fmall, as the eye is near to, or remote from the object.

Let it be intended to take both objects A, and B, into one view, with the addition of trees to the right, and to the left of them. Let vifual rays be drawn from the extreme tree on either fide, to the ftation S: the angle C S D is the angle of view under which the whole extent is feen; and the rays C S and D S are denominated the extreme vifual rays of the view.

Objects may be placed too near the eye for fatisfactory obfervance of them; they may be placed fo near as to pain the eye. The eye can contemplate only a point at one time; it is by its celerity and continual motion, that it becomes perfectly fenfible of a whole, or many forms. But when an object, or many

objects, widely extended, are placed too near, the traverſes of the eye in con- [Plate 23.] templation of the whole become painful. It is not neceſſary for me to account *why* it is ſo, but *that* it *is* ſo, every one muſt have experienced; and when that is the caſe, the cauſe, or the eye, is removed to a more agreeable diſtance, or the head, as well as the eye, is turned from one ſide to the other, the better to comprehend the extent of the object or objects in view.

The neceſſity of turning the head ſhould be avoided in taking a view: a view ſhould compriſe no greater extent than the eye can agreeably contemplate at one *coup d'œil* (or glance of ſight), or than can be viewed by a pleaſing and ſatiſfactory traverſe of the eye alone; which neceſſarily confines the extent of matter, and of courſe the angle of viſion, to ſome certain limits. The eye reſts with compoſure on what it can contemplate with little trouble; not only too great an extent, but too many objects, however they may intereſt and delight at firſt, ſoon diſtract and tire the eye, a circumſtance that may account why a picturesque bit gives more delight than an extenſive ſcene compriſing many parts.

Smallneſs of object has nothing to do with angle of view; a die, or the ſmalleſt miniature, by being placed too near the eye, may form a large angle of view, and cauſe the eye pain in obſerving it. A large extent of view, or a large picture, may be contemplated with as much eaſe as a ſmall one; it is only placing the larger at a greater diſtance. If the place of the plane of delineation be at FG (Fig. 1), then will the angle FSG be the angle of view. If a ſection of the ſame viſual rays be taken at HI, then will HI be the extent of the picture, and the angle HSI be the angle of view; but the angles FSG and HSI are one and the ſame, of conſequence the eye can contemplate either picture with equal ſatisfaction [a]; but then one muſt be placed at the diſtance SO, the other at the diſtance SP.

From whatever ſtation an object be viewed, however diſtant, or however near, it never appears otherwiſe than on reflection we know or expect it ſhould do. Far different is the caſe with reſpect to perſpective delineation on planes, according to certain poſitions. To find the repreſentation of a circle, viewed horizontally, aſſume the figure of an upright oval, as Fig. 2: or the repreſentation of a ſquare ſo poſited, aſſume the form KMNL, Fig. 2; muſt certainly excite doubt in the mind of the *young* ſtudent, as to the truth of the

[a] In this view of the ſubject of viſion, what is termed near, or ſhort ſightedneſs, is not taken into conſideration, that is looked upon as a defect in the organ itſelf.

[Plate 23.] rules by which fuch delineations, fo repugnant to belief, are afcertained, and given as the reprefentations of fuch well-known forms. Yet fuch may neverthelefs be true and juft reprefentations, according to the point of view taken, and pofition chofen of the plane of delineation.

It is the fhortnefs of the diftance of the eye from the plane of delineation, that caufes fuch unpleafant diftortion. This may clearly be feen by infpection of Fig. 3, where, let the figure ABCD reprefent a fquare lying on the ground plane; let the plane GHKL be the plane of delineation, and let E be the point of view. It muft be evident by the vifual rays EA and EB, that the figure DabC, on the plane of delineation, is to the eye at E, the reprefentation of the fquare ABCD, and that an oval defcribed therein would, of courfe, be the reprefentation of a circle, and would be as much diftorted as the oval within the fquare KMNL, Fig. 2. But let the eye be removed to a greater diftance from the plane of delineation, fuppofe to the point *E*, then will the reprefentation of the fquare, and circle within, come within more admiffible and pleafing forms; as may be gathered by the vifual ray to the farther place of the eye *E* in the diagram, Fig. 3, determining the figure DefC as the reprefentation of the fame fquare; and which feen directly before the eye, would be as the lower fquare KOPL, and circle within, Fig. 2.

To fix upon an angle that fhould extend to every cafe, as being the *beft* angle of view, would be as vain, as it would be an abfurd endeavour. Different fubjects require different treatment; infide fubjects different from external ones, and external ones from each other, as they happen to be fituated.

The angle of view, as was before obferved, is regulated by the diftance of the eye from the plane of delineation. Thus, if GL, Fig. 4, be the extent of the picture, and A the diftance of the point of view, the angle GAL will be the angle of view; and fo on, every remove of diftance varying the angle of view of the fame extent looked at. Some authors on perfpective have expreffly advifed, that the greateft diftance of the eye from the picture fhould not exceed the width of the picture laterally, which makes the angle of view fifty-three degrees. Others would have the diftance lefs, requiring the angle of view never to be fmaller than an angle of fixty degrees; fuch is the angle GAL; others are for having a ftill lefs diftance to be the greateft ufed, and, of confequence, would have a larger angle of view than fixty degrees. My Father, who, I am perfuaded, fpeaks from more practical experience than any of his predeceffors, advifes the extent of the picture, laterally, to be the leaft diftance ufed, its angle of view fifty-three degrees, or at the very moft, fixty

degrees, to the largeſt angle of view; and recommends an angle of forty-five degrees as the beſt angle of view, being, in his opinion, neither too large nor too ſmall; ſuch is the angle GBL. It is his advice to keep between the one and the other, that is, not to let the angle of view exceed ſixty degrees, nor be leſs than forty-five; too large an angle of view ſubjecting the objects to diſtortion, and too ſmall a one rendering them too tame. His advice I know, from my own experience, to be ſtrictly good; I have, however, in ſome inſtances, in actual views, experienced the abſolute neceſſity of uſing a larger angle of view than ſixty degrees, but ſuch do not often occur. After all that can be ſaid, determination in this particular muſt ever be left to the diſcretion of the artiſt, and the abſolute neceſſity his ſubject lays him under, as to the adoption of his angle of view. [Plate 23.]

The angle of view determined, as alſo the extent of matter to be included in the view ſettled, it will then remain to place the plane of delineation in the moſt judicious manner. In regarding a picture, the obſerver, in general, places himſelf in the middle of it, between its lateral extremes, with his eye perpendicularly oppoſite to where the horizon is concluded to be, as nearly as he can determine it. Such being the ſtation whence a picture is uſually regarded, from ſuch point of view it ſhould be that the artiſt ſhould calculate his effects to be the moſt perfect, both as to linear and aerial perſpective; and which, as far as the influence of linear perſpective extends, is very eaſily effected.

The angle of view being determined, how to place the plane of delineation in the moſt judicious manner, before the eye of the obſerver.

Biſect the angle of view, and place the plane of delineation at right angles with the line of biſection; which alſo place nearer or farther from the point of view, as the picture is required to be ſmall or large.

The angle of view, FSG, Fig. 1, Plate 23, is biſected by the line SP, and the pictures FG and HI are each placed at right angles, or perpendicular to the line of biſection, SP; each of which pictures ſtands directly before the obſerver, as required: others might be thus placed, at pleaſure, agreeably to the dimenſions of the picture deſired.

From ſuch poſition of the plane of delineation, the eye of the obſerver, or, what is the ſame thing, the point of view, comes directly in the middle of the picture, laterally, with the eye level with the horizon; and from the ſtation generally choſen to regard a picture, a picture ſo proceeded on muſt make its moſt perfect appearance. In ſome caſes, however, this abſolute poſition may, and muſt be deviated from; but it is neceſſary to know where perfection is, that departure from it may be known, in order that ſuch departure may be the leaſt poſſible, agreeably to the ſubject in hand.

[Plate 23.] Let the boundary line around Fig. 5, be the dimenſions of a picture. Let the line A B be the horizon, parallel to the bottom edge, or ground line of the picture; then will the point C, in the middle, be the point that ſhould be oppoſite the point of ſight, or point of view; which point C, late writers on perſpective have termed the centre of the picture, and which has been ſo defined in this work. If the horizon, which is quite arbitrary, be placed higher on the plane of the picture, as at the line DE, then would the point F, agreeably to the principle laid down, be the moſt eligible place for the centre of the picture. If the horizon were taken ſtill higher, as in ſuch repreſentations as are termed bird's-eye views, at G H for inſtance, then would the point I be the beſt ſituation for the centre; always placing it in the middle between the two extreme ends; as then the ſpectator being directly before the picture to obſerve it, places himſelf neareſt its true and juſt point of view, which would not be the caſe, had the effects of the linear repreſentation been calculated from the point K, *K*, or 𝒦; leſs ſo if it had been calculated from the point L, *L*, or ℒ; and ſtill leſs ſo, if delineated agreeably to the point M, *M*, or ℳ, as the centre; but which, from want of knowing better, are often as erroneouſly, though unwittingly, delineated.

From what has now been advanced in this work, if thoroughly underſtood, it is poſſible to perform any thing that linear perſpective can effect; but it is apprehended, few will feel themſelves competent to ſuch a trial. There are perſons of ſuch profound thinking, ſo acutely penetrating, that from a cloſely compacted theory can extract a general practice. To ſuch, BROOK TAYLOR's condenſed Elements on this ſubject, would be ample inſight. But works like his are not addreſſed to the many: one compacted general obſervation needs much elucidation to make it manifeſt to the multitude: wherefore the neceſſity of works of a more open inquiry, of more familiar and minute inſtruction, and according to the different powers and intention by which authors work, different roads are made to the ſame ſummit, and each who follows will prefer that path which, moſt agreeably to his humour, will conduct him to the object he wiſhes to attain.

The endeavour to avoid trouble is continually inſtanced in every occupation in life: Lazy perſons give themſelves moſt trouble, ſays the proverb. Complaint may be made of the extraordinary tedioufneſs of true perſpective delineation, and impatience may ſpurn at the apparent tedioufneſs of the proceſs. From my own experience I have ever found, when by lazineſs or impatience I have been induced to ſlight or reject the application of rule, that at laſt I have been forced to have recourſe to it, even for the advantage of that diſpatch

Fig. 1.

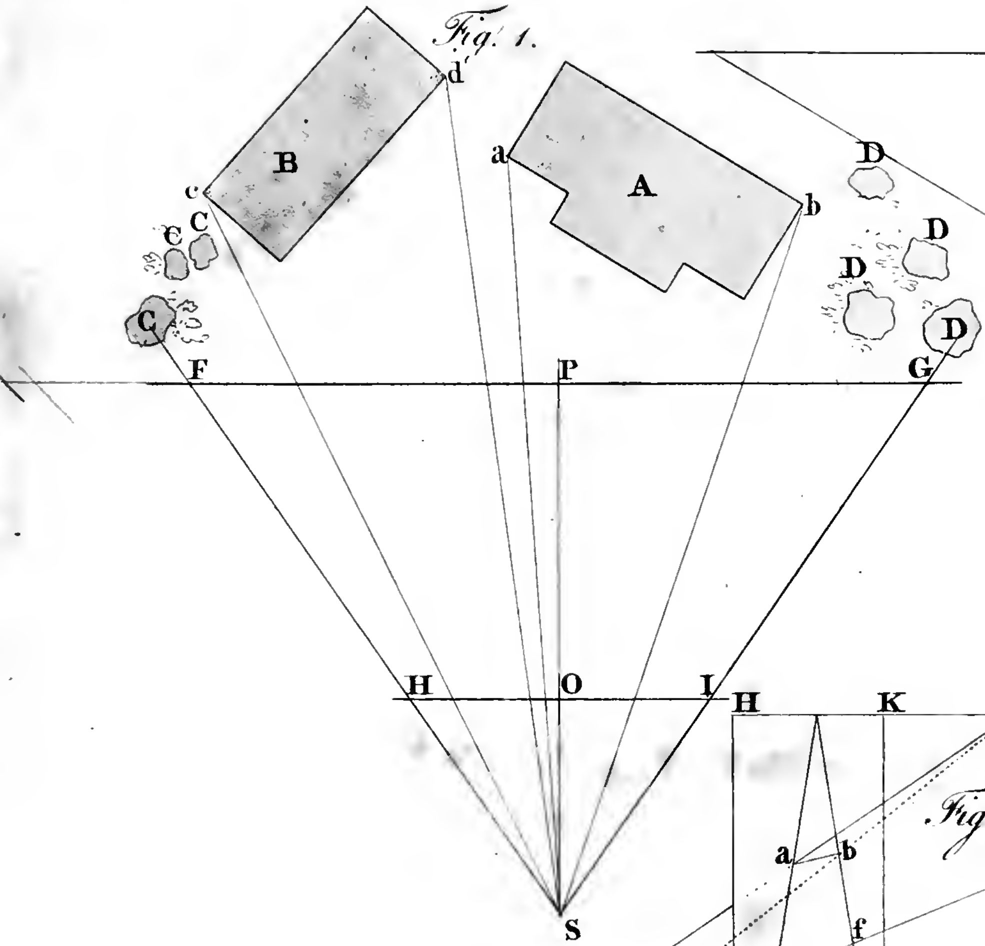


Fig. 2.

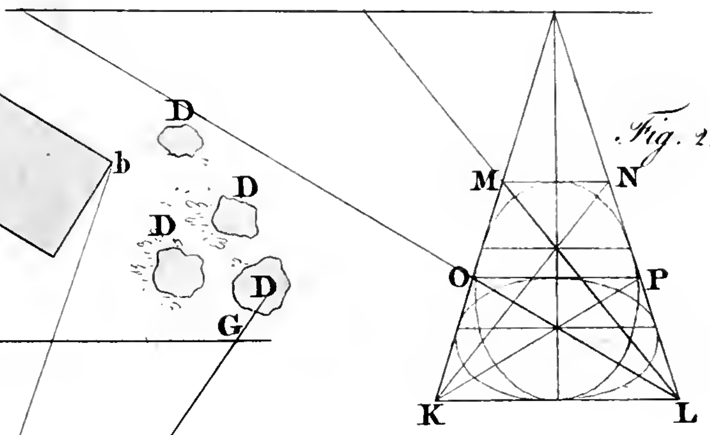


Fig. 3.

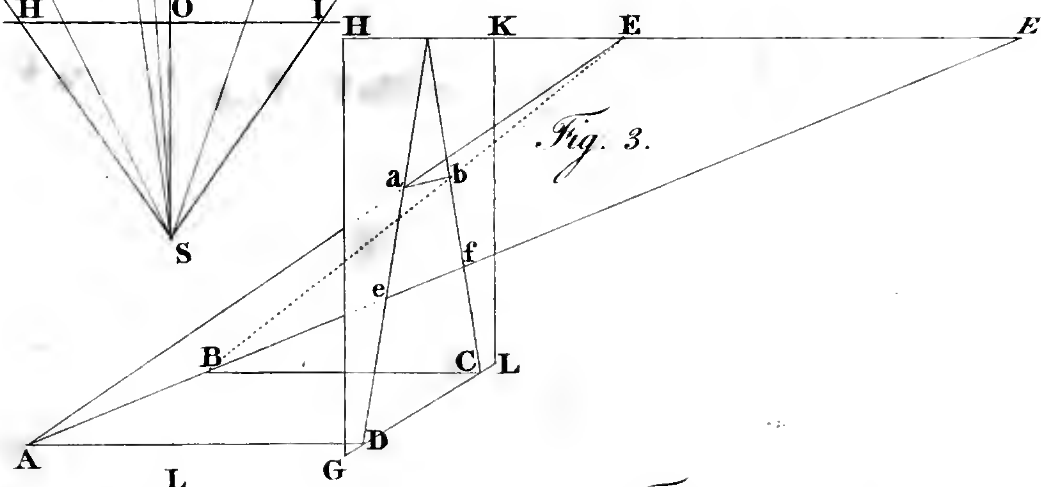


Fig. 4.

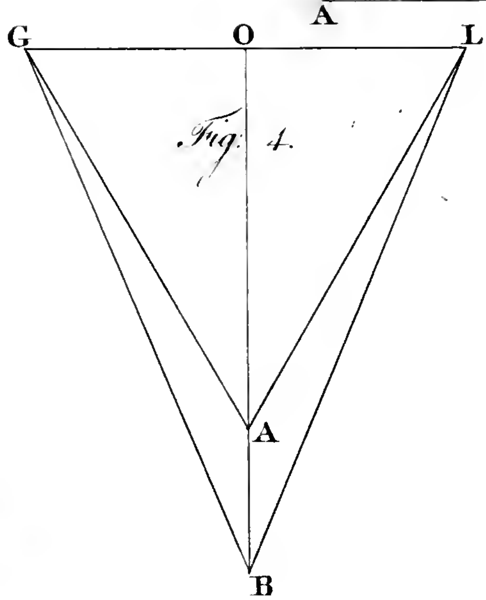
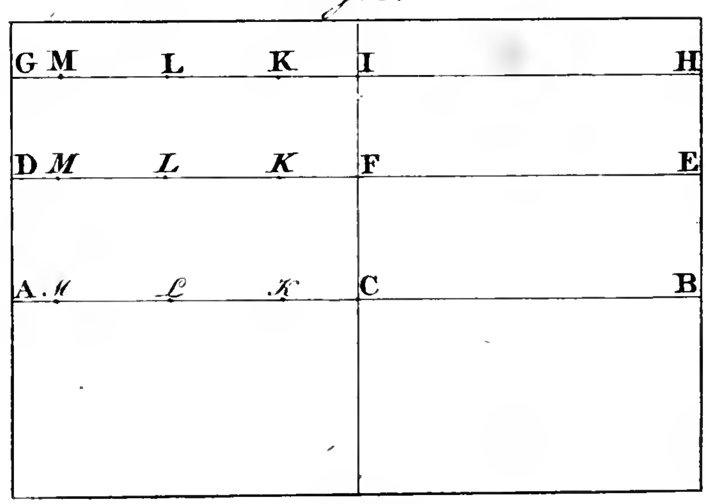


Fig. 5.



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I was endeavouring otherwise in vain to obtain, and after considerable time had been lost, to wave the necessity of the appeal. Thus had the aid of method been first applied to, not only much time had been saved, but the delusive effect required been better accomplished. However strong the wish to shorten the road leading to a desired object, that way is not always found the readiest, that seemingly points the most directly to it. Sir Joshua Reynolds, in his divine Discourses on Painting, most aptly speaks my sentiments; and says, "The impetuosity of youth is disgusted at the slow approaches of a regular siege, and desires, from mere impatience of labour, to take the citadel by storm. They wish to find some shorter path to excellence, and hope to obtain the reward of eminence by other means than those which the indispensable rules of art have prescribed.—In this art, as in others, there are many teachers who profess to show the nearest way to excellence; and many expedients have been invented by which the toil of study might be saved. But let no man be seduced to idleness by specious promises. Excellence is never granted to man, but as the reward of labour." [Plate 23.]

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